EXAMINATION OF NON-INPATIENT NURSES ABILITY TO ENGAGE IN PATIENT COUNSELING RELATED TO PHYSICAL ACTIVITY AS A HEALTH BEHAVIOR

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EXAMINATION OF NON-INPATIENT NURSES ABILITY TO ENGAGE IN PATIENT COUNSELING RELATED TO PHYSICAL ACTIVITY AS A HEALTH BEHAVIOR

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Physical activity is suggested in the prevention and treatment of chronic disease. Current guidelines recommend at least 150 minutes of physical activity per week. Registered nurses in the non-inpatient setting may have the opportunity to provide patient counseling about physical activity. PURPOSE: The purpose of this study was to examine the counseling behaviors of non-hospital based registered nurses (RN's) related to physical activity counseling. This study examined the influence of level of nurse training, years of experience, and personal physical activity behaviors on these outcomes. METHODS: Nurses from a state board of nursing and from an academic medical center (N=117) were surveyed regarding counseling behaviors, barriers to counseling, knowledge, ranking of health risk priorities and confidence with physical activity counseling. RESULTS: Of five health risk counseling behaviors queried, 80.9% of nurses reported discussing with patients the intent to adopt a new health behavior; 75.4% of nurses reported advising patients to set goals for health. Respondents reportedly counsel 40% of patients on physical activity for 6.36 (±8.9) minutes per patient and the majority of nurses (68%) reported they agree or strongly agree they are confident counseling about physical activity. Nearly 60% correctly reported current guidelines as 150 minutes or more of physical activity per week. Of 10 health risk behaviors counseled by nurses, physical activity ranked 3rd highest of

10. The most frequently reported barrier to physical activity counseling was “patient not receptive”, reported by 47% of respondents. Further investigation of influence of level of nurse training, years of experience and personal physical activity behaviors on counseling behaviors of nurses is necessary. The results of this study should be interpreted with caution. The smaller than projected sample size, the low response rate and the selected groups of nurses may reduce the generalizability of these findings. CONCLUSION: Non-hospital based nurses are counseling patients regarding physical activity. The majority of nurses reported they are 4

confident with physical activity counseling. Further investigation should expand the group of nurses and should recruit with intent of adequately representing targeted aims. Additionally, the role of training, years of experience and personal behavior should be emphasized.

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PREFACE

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1.0 INTRODUCTION

Physical inactivity is a major contributor to morbidity and mortality in the United States. Risks of health-related consequences associated with low levels of physical activity (PA) include preventable chronic conditions such as cardiovascular disease (CVD), diabetes, overweight and obesity, arthritis, some types of cancer, anxiety and depression. [1-5] In 2000, there were approximately 125 million adults with chronic diseases. An anticipated 157 million people will have a chronic disease by the year 2020, which is projected to consume nearly 80% of the healthcare costs in the United States. [5-7] Reducing diseases and health related costs associated with these conditions is a public health priority. One approach to improving health and reducing chronic disease associated with inactivity is to improve the overall level of PA participation in the population.

Public health approaches, media campaigns and dissemination of current recommendations through healthcare providers (HCP's) are targeted methods of increasing PA in day to day living. The HCP workforce is comprised of nearly 3 million physicians (MD's) and registered nurses (RN's) who are influential sources of health information. [9, 62] The average number of visits to a HCP per year is reportedly 3 visits per person. [9] Although PA counseling by HCP's has contributed to increased PA participation among adults, current trends in PA counseling show that only 1 in 3 persons who visited their HCP within the previous year were

given PA advice. [9-12] Thus, it is important to implement strategies that allow for PA counseling in the 2 out of 3 persons who do not receive this counseling from their HCP's.

1.1 SIGNIFICANCE

Physical inactivity is a contributing factor to many health-related conditions and increasing physical activity is a proposed solution to improve overall health. It is estimated that one third of adult Americans fail to meet PA recommendations. [13] PA guidelines and various public health initiatives provide a framework for incorporating PA into lifestyle and leisure time activity. [14-17] Although these strategies have been suggested, the reported rates of physical inactivity in the United States continue to be as low as 43 to 76.9% of the age-adjusted population not regularly engaging in some type of PA daily. [1, 3, 4, 17]

PA counseling does not routinely occur in practice and frequently only occurs when patients present with obvious risk factors, such as diabetes, overweight or obesity or when patients have been diagnosed with cardiovascular disease. [9, 18-21] PA counseling needs to occur for every patient and is suggested as the 5th vital sign to be included on assessment. In addition to temperature, heart rate, respiratory rate, and blood pressure, assessing the level of one's PA can occur by asking patients the average amount of days per week they participate in moderate or greater physical activity and on those days, the number of minutes per week they participate at that level. [9, 22, 23] Existing studies examining PA counseling by physician's (MD's), nurse practitioners (NP's), and physical therapists (PT's) show positive patient outcomes. [20, 24-31] Fewer studies have examined the role of the registered nurse (RN) in addressing PA counseling.

RN's are inherently trained to provide patient counseling as part of nursing education. RN-directed health counseling is viewed as a means of improving health and RN's are expected to provide patient education as part of routine nursing care. RN counseling has been effective for diabetes, hypertension, and cardiac rehabilitation. [30, 32-24] As a result, it is postulated that RN's could also effectively provide PA counseling if properly trained. Thus, this study focuses on examining the factors that may contribute to nurses to effectively counseling patients on physical activity within a non-inpatient setting, which may be important for enhancing training programs for nurses.

1.2 SPECIFIC AIMS

This study examined the following specific aims:

1. The counseling behaviors of RN's related to health risk behaviors.
2. The counseling behaviors of RN's related to physical activity behaviors.
3. The RN's knowledge of the amount of physical activity that is recommended for health.
4. The degree which RN's prioritize counseling patients on physical activity compared to health behaviors (smoking, nutrition, and alcohol).
5. The barriers that exist that interfere with RN's counseling about PA.
6. The self-efficacy that RN's report related to physical activity.

In addition, the following exploratory aims were examined:

7. Whether level of training of the RN (i.e., Associates Degrees, Bachelor of Science in Nursing, Master of Science in Nursing) influenced:
    a. The counseling behaviors of RN's related to health risk behaviors.
    b. The counseling behaviors of RN's related to physical activity behaviors.
    c. The RN's knowledge of the amount of physical activity that is recommended for health.
    d. The degree to which the RN's prioritize counseling patients on physical activity compared to health behaviors (smoking, nutrition, and alcohol).
    e. The barriers that exist that interfere with RN's counseling about PA.
    f. The self-efficacy that RN's report related to physical activity.
8. Whether years of nursing experience influenced:
    a. The counseling behaviors of RN's related to health risk behaviors.
    b. The counseling behaviors of RN's related to physical activity behaviors.
    c. The RN's knowledge of the amount of physical activity that is recommended for health.
    d. The degree to which the RN's prioritize counseling patients on physical activity compared to health behaviors (smoking, nutrition, and alcohol).
    e. The barriers that exist that interfere with RN's counseling about PA.
    f. The self-efficacy that RN's report related to physical activity.
9. Whether years of nursing in primary care, home care, or public health influenced:
    a. The counseling behaviors of RN's related to health risk behaviors.
    b. The counseling behaviors of RN's related to physical activity behaviors.

c. The RN's knowledge of the amount of physical activity that is recommended for health.

d. The degree to which the RN's prioritize counseling patients on physical activity compared to health behaviors (smoking, nutrition, and alcohol).

e. The barriers that exist that interfere with RN's counseling about PA.

f. The self-efficacy that RN's report related to physical activity.

10. Whether self-reported personal behavior influenced:

a. The counseling behaviors of RN's related to health risk behaviors.

b. The counseling behaviors of RN's related to physical activity behaviors.

c. The RN's knowledge of the amount of physical activity that is recommended for health.

d. The degree to which the RN's prioritize counseling patients on physical activity compared to health behaviors (smoking, nutrition, and alcohol).

e. The barriers that exist that interfere with RN's counseling about PA.

f. The self-efficacy that RN's report related to physical activity.

2.0 LITERATURE REVIEW

2.1 HEALTH BENEFITS OF PHYSICAL ACTIVITY

Physical activity (PA) is any bodily movement produced by skeletal muscle that results in energy expenditure. [21] PA reduces the effects of chronic diseases including cardiovascular disease, diabetes, cancer, obesity and other health related conditions. [5, 7, 35] Meeting the recommended levels of PA is essential to health. Although there is variability among organizations and the recommendations may vary depending on disease state, implications from most research suggest that greater amounts of PA produce greater benefits. [5, 35, 36] PA recommendations continue to evolve over time, depending on scientific findings and on desired health outcomes. Numerous studies have investigated the associations between PA, sedentary behavior and health.

Nearly a decade ago, PA recommendations advised an accumulation of 30 or more minutes of moderate intensity PA on most, preferably all, days of the week. [5, 7, 31] These well published guidelines have been used to promote PA across settings. Although, more recent evidence has suggested that 30 minutes may be enough PA to improve overall health, but greater doses of PA may be necessary to reach different goals. A dose-response relationship exists between volume of PA and health benefits, implying that higher volumes of moderate to vigorous exercise result in lower risk of all-cause morbidity and mortality.[7, 35, 37, 38] Moreover, physical activity has been associated with a reduction in risk for a variety of health conditions as summarized below.

2.1.1 Cardiovascular Disease

Cardiovascular disease (CVD) is the leading cause of death in the United States among both men and women. [38] CVD occurs when there is repeated endothelial exposure to injury, leading to vessel damage and atherosclerosis. Atherosclerosis and endothelial damage are biological responses to chemicals released within the body. [35] Atherosclerosis results in plaque build-up, narrow arterial walls, altered blood flow and could eventually result in hypertension, coronary heart disease (CHD), myocardial infarction, and stroke. [35, 39] Collectively, these conditions contribute to CVD-related deaths.

PA results in blood pressure reduction, improved coronary perfusion and altered cholesterol concentrations.[35] Brisk walking, running, leisure time PA (LTPA), endurance training, high intensity interval training, and resistance training have been studied for the influences on health outcomes. Reductions in blood pressure, increased stroke volume, improved insulin resistance, and lower cholesterol levels are seen. One occurrence of aerobic activity can reduce blood pressure and improve lipid and lipoprotein levels for up to 24-48 hours. [35-36] Physical inactivity has been estimated to show relative risks similar to other CV risk factors including elevated total cholesterol, high blood pressure, and cigarette smoking. [35, 40] The benefits of PA on CV mortality are realized regardless of BMI, blood pressure, cholesterol, or smoking habits. [82] PA is endorsed by many organizations and is suggested as an effective method for prevention and treatment of CVD.

Cardiovascular (CV) mortality reduction is discussed in multiple research studies. An investigation of PA on cardiovascular disease mortality evaluated the effects of occupational PA, LTPA, and commuter PA. In this retrospective analysis, 64% of the 3,316 patients died of CVD. After adjustments for all other categories, occupational activity results showed moderately active

work was associated with a 9% lower CV death rate and active work was associated with a 40% lower CV mortality; high levels of LTPA were associated with 33% lower CV mortality, moderate LTPA was associated with 17% lower CV mortality. Commuter activity did not significantly influence CV mortality risk reduction. [82]

Further investigation of activity on CHD death risk was examined in a longitudinal study of 12,516 Harvard alumni from 1977-1993. The Harvard Alumni Health Study investigated the activity levels of men aged 35-74 via self-reported questionnaire survey. Self-reported data included distance walked, number of stairs climbed, and the amount of time spent engaging in either sports or recreational activity and was measured in kilojoules (kJ) per week. Increased activity was clearly associated with lower CHD-related risk. Men who spent >4,200 kJ per week had a lower risk of CHD in comparison with those who spent <4,200 kJ per week. Additional findings showed that males who were previously sedentary but became physically active had a 17% lower CHD-related death risk than sedentary males who did not improve PA level. Moderate to vigorous PA participation (measured in metabolic equivalent (MET) levels) was correlated with a 41% lower CHD death risk; with every incremental increase of 1 MET level, there was a decrease in CHD risk of 12%. [35, 40, 41]

Additional evidence is seen in a retrospective study which investigated occupational activity of men who died of CHD. Pathology reports of 5,000 workers of various occupations were studied. Occupational activity was categorized as light, active, or heavy. 1,200 deaths were attributed to CHD overall, 482 CHD deaths occurred in those who performed light work, 436 deaths occurred in those who performed active work and 230 deaths occurred in those who performed heavy work at a ratio of 1.0:0.9:0.48. CHD was more closely associated with light work (sedentary). [42]

CHD-related mortality was evaluated in another study which prospectively investigated occupational activity of 6,351 male dock workers in the United States over 22 years. This study classified occupational activity as high, medium, or low according to calorie expenditure. Longshoremen whose activity was high showed a lower death rate than the medium and low level activity workers (26.9, 46.3, and 49 of the age- adjusted rate of death per 10,000 work years respectively). [35, 43]

Further support for the PA-related effects on CVD is demonstrated in a hallmark study comparing occupational activity of bus workers and effects on CVD. The risk for double decker bus workers who regularly walked bus stairs was compared to the risk of bus drivers who were more occupationally sedentary. There was nearly a 50% lower CVD-related incidence in those who walked versus the more occupationally sedentary bus drivers, suggesting that occupational activity results in positive CVD effects [35, 42] Conclusive evidence shows that CVD risk is reduced with regular participation in PA.

2.1.1.1 Physical activity effects on blood lipids

Lipids and lipoprotein values impact CVD when blood concentrations are at sub-optimal levels. Total cholesterol is comprised of high density lipoproteins (HDL's), low density lipoproteins (LDL's) and triglycerides. Dietary and aerobic activity interventions have been recommended for reducing lipid and lipoprotein concentrations.

The benefits of PA on HDL cholesterol can be seen in a study evaluating the dose-response relationship between vigorous exercise and risk factors for CHD, particularly HDL cholesterol. In this study of HDL in distance runners, comparisons were made for a group of 1,837 recreational female runners who exercised at levels exceeding current recommendations of 3.2 kilometers (km) per week. Cross-sectional survey data compared with medical laboratory

values showed a higher average HDL cholesterol concentration with longer distances. For every km >3.2 km/week, there was an improved HDL concentration (±SE) of 0.133±0.020 mg/dL in women, findings similar to those reported in men (1.136 ± 0.006 mg/dL). Additional data from this study showed that HDL concentrations >100, 90, or 80 mg/dL were significantly more likely to occur (P<0.02) in women who ran >64 km per week compared to women who ran <48 km per week. There was no relationship between LDL cholesterol and triglyceride level based on distance (β=-0.03±0.04 mg/dL, β= -0.049±0.074 mg/dL per km per week). [45] These findings support the evidence that PA can have positive implications on lipid values.

Currently, it is estimated that a 2% reduction in the rate of CHD occurs with a 1% reduction in population levels of total cholesterol, reducing the overall rate of CHD by 15%. Further empirical evidence shows that reducing the ratio of total cholesterol to HDL's would contribute to a 21% lower CHD risk.[36, 44] Although evidence from a systematic review evaluating PA and response of blood lipids shows small effects of PA on total cholesterol, triglycerides, and low density lipoproteins (1.0% (p=NS)), (3.7% (p,0.05)), (5.0% (p,0.05)), the positive effects on HDL's and the moderate effects on other lipid responses warrants PA to be considered effective as an adjuvant therapy to prevent or reduce hypercholesterolemia.[115]

2.1.1.2 Physical activity effects on hypertension

Hypertension is currently defined as systolic blood pressure (SBP) of 140 and/or diastolic blood pressure (DBP) of 90mmHg measured on two different occasions. [35, 39] Continually high arterial pressure results in endothelial damage and can lead to small vessel damage of the organs such as the eyes and the kidneys, and can promote conditions for a stroke.

PA stimulates several processes which result in lower blood pressure (BP). Lee postulates that BP reduction is the result of several physiological changes, including lower

catecholamines, lower total peripheral resistance, and vasodilator/vasoconstrictor changes. [46] Immediate post-exercise effects on BP include sympathetic post exercise endothelial vasodilation and baroreceptive post -exercise hypotension. A release of chemicals alters endothelial function improving cardiovascular perfusion. PA- induced stroke volume increases in adaptation to the demands for oxygen to improve blood flow. [35, 47] Inflammatory responses in the endothelium decrease, lowering the risk for endothelial damage. The reduction in adiposity that is associated with increased PA also contributes to lower BP, reduced inflammatory response, and improved CVD risk. [35,37, 47] Collectively, these physical adaptations to PA result in a reduction in BP.

Findings demonstrating the effects of PA on BP were presented over a decade ago in research which compared distance in 1,837 women runners to evaluate CHD risk factor outcomes. In this study, a significant reduction in SBP and DBP (β= -0.06 ± 0.02 mm Hg and β= -0.028±0.013 mm Hg per km per week respectively) was noted in distances exceeding current exercise guidelines of 3.2 kilometers. Longer distances showed greater benefit. [45]

BP response to changes in PA levels was also presented in the results of The Aerobic Center Longitudinal Study (ACLS). In this six year study, changes in fitness (maximal treadmill test) and fatness (BMI and percent body fat) were assessed on 3,148 healthy adults during 3 different medical examinations. Hypertension developed in 752 adults during this time, an incidence rate of 39.2 per 1,000 person-years. The incidence of hypertension was 26% and 28% lower in adults who maintained or improved fitness, respectively, and 27% higher in those who gained weight (body fat percentage). Measurements of blood pressure between baseline and the second medical exam showed a 7% lower risk of hypertension with every 1 MET increase in fitness, and although statistical significance was not reached, the implications of the positive effects are noteworthy to clinicians. [46]

Additional support for BP-related PA effects is reported in a meta-analysis examining the effect of aerobic exercise on reducing BP. The meta-analysis examined 54 studies and 2,419 participants. Overall findings reported that aerobic exercise is effective for reducing SBP by -3.84 mm Hg and DBP by -2.58 mm Hg. In this investigation, the BP lowering effect was noted in all frequencies, intensities, and types of aerobic exercise.[47]

2.1.2 Type II Diabetes Mellitus

Type II diabetes mellitus (Type II DM) affected 171 million people worldwide in 2000 and is projected to reach 366 million people by the year 2030. [5] Risk factors for Type II DM include overweight people (BMI ≥25kg/m²) who have at least one of the following: sedentary behavior, an immediate relative with diabetes, at risk race or ethnicity, hypertension, HDL <35mg/dL and/or triglycerides >250mg/dL, HbA1C ≥5.7%, CVD, and/or women who have polycystic ovarian syndrome or who have delivered a baby >9 lb or had gestational diabetes. PA is considered an effective method of prevention and treatment for Type II DM. PA results in increased glucose tolerance and improved glucose transport for use by muscle. [48]

In a RCT of 74,240 post-menopausal Caucasian women measuring energy expenditure (EE) in relation to occurrence of Type II DM , risk of Type II DM was 26% lower when a greater amount of energy was spent on walking (EE 10.1-40.8 MET hours per week) (HR=0.74, 95% CI=0.62-0.89) ($p<0.001$) and there was a 33% lower risk of Type II DM in the group who demonstrated greater overall PA (EE 23.4-143.0 MET hours per week compared to 0-2.3 MET hours per week) (HR=0.67, 95% CI=0.56-0.82) ($p=.002$). [5, 37]

Additional evidence evaluating the effects of PA on the risk of developing Type II DM is demonstrated in a 6 year study of 8,633 non-diabetic men. Fitness levels were compared as a

risk factor for developing impaired fasting glucose levels or the risk of developing Type II DM. Men who had a low fitness level had a 1.9 fold greater risk of impaired fasting glucose and a 3.7 fold greater risk of developing Type II DM than the men with high fitness levels (20% least fit with VO2 max of 9.3 METS compared to 40% most fit with a 13.7 METS).[49]

The risk for Type II DM drops as insulin resistance improves. Changes in body composition and improved skeletal muscle sensitivity to insulin influence the metabolic processes that affect insulin resistance. Aerobic exercise improves insulin sensitivity.[83] The implications that PA is relevant to preventing or reducing Type II DM are supported in research.

2.1.3 Overweight and obesity

Obesity in the United States is at an all-time high with nearly 68% of adult Americans considered overweight or obese. [50] Overweight is defined as body mass index (BMI) of 25.0-29.9 kg/m². Obesity is defined as BMI ≥30.0 kg/m².[35]

Overweight and obesity contribute to CVD, osteoarthritis, cancer, metabolic syndrome, and diabetes, among other conditions. The influence of PA on overweight and obesity not only has the potential to impact weight loss or weight maintenance but can also reduce morbidity associated with improved physical functioning and decreased chronic disease rate related to fatness. [5] PA has been associated with weight gain prevention, treatment of overweight and obesity, and is used to maintain healthy weight, or to help maintain weight loss.[1, 4, 5, 7]

Evidence that PA is effective in preventing weight gain was reported in an 11 year follow up study of 21,685 normal weight healthy men aged 20-69 years. Leisure time PA (LTPA) (walking, skiing, swimming or working out) was measured and analyzed in relation to changes in BMI over time. Over an 11 year span, there was an increase in mean BMI of 1.8 kg/m² (s.d. 1.7

kg/m², range -4.4 kg/m², 11.70 kg/m²) in all age groups, but individuals who reported participation in regular LTPA showed a gain of 0.12kg/m² less than inactive participants over the span of 11 years (95% CI: 0.04, 0.20). While age-related weight gain was typical, the individuals who participated in higher levels of LTPA experienced a mean lower weight gain. [5, 51]

Another study conducted in 2005 reported that weight gain associated with aging was preventable with increased levels of activity. The study investigated 15,000 overweight or obese adult Americans, aged 52-57. Those participating regularly in PA showed some weight loss. When comparing levels of activity measured in MET hours, even low levels of PA resulted in some weight loss compared to no activity. Women with BMI>25, 25-<30, and ≥30 kg/m² OR of 5% showed greater weight loss of 3.47, 7.38, and 3.05 in active versus inactive participants. Similar findings were reported for men with BMI 25-<30 and ≥30 kg/m² the OR =2.42 and 2.34 respectively. [5]

The effects of calorie expenditure through PA were investigated in relation to weight loss. Research has indicated that PA can help sustain changes in weight. According to a randomized controlled trial conducted in 2007 on the role of PA in weight loss and weight maintenance, 202 participants were evaluated over 30 months. The activity intervention took place for 18 of the 30 months of the study. The effects of standard behavioral treatment (SBT) were compared to the effects of an intervention which included a component of high physical activity (HPA). Measurements taken at 12 and 18 months showed a significant weight loss difference (P<0.01) in the HPA group (2,500 kcal/week EE) compared to the SBT group (1000kcal/week EE). At 30 months, when activity levels were not significantly different (1,390 kcal/week SBT and 1,696 kcal/week HPA) (P>0.10), weight loss differences between groups

became non- significant (0.90±8.9 kg; 2.86±8.6 kg) in the SBT group and the HPA group respectively (P=0.16). [52] The American College of Sports Medicine has issued a position stand recommending participation in 150-200 minutes of PA per week for weight gain prevention or modest weight loss and 200-300 minutes per week of moderate to vigorous intensity PA for long-term weight loss and weight regain prevention. [53]

2.1.4 Cancer

Cancer is the 2nd leading cause of death in the United States, with lung cancer being the most prevalent in both men and women. In general, the prevalence of cancer can be attributed to environmental factors, age, modifiable personal risk factors-smoking, diet, physical inactivity, and overweight and obesity. [35, 38]

Although risk factors for cancer continue to be researched, convincing evidence shows that individuals who are less active have a higher incidence of cancer.[54-57] Sedentary behavior contributes to overweight and obesity resulting in a cascade of events which contribute to cancer occurrence. [54] A combination of factors has been considered influential in cancer development including alteration in sex hormones, metabolic disturbances, inflammation, and low levels of Vitamin D. Because PA has been shown to reduce the effects of these factors on cancer development, PA is recommended as a preventative measure. [35]

An opinion statement by Newton and Galvao presents data from relevant studies evaluating the benefits PA can have on cancer, and report the incidence of cancer can be reduced by as much as 40% with regular and vigorous PA participation and the most convincing evidence exists for breast and colon cancer and is building for prostate cancer. [55] Additionally, there is evidence that post-diagnosis cancer patients who participate in regular PA have improved

outcomes and reduced risk of cancer recurrence. Exercise should be considered a form of medicine in cancer patients. [55]

2.1.4.1 Colon Cancer

Upon examination of the findings for specific types of cancer, it is reported that the risk of colorectal cancer can be reduced by as much as 20-30% with regular participation in PA. [55] According to a meta-analysis from 2007, there was a reduced risk of colorectal cancer (RR=2.0) in those who were physically active compared to physically inactive individuals [5].

In 2008, a systematic review of leisure time physical activity (LTPA) concluded that the highest levels of LTPA were associated with reduction in colon cancer in men and women. Fourteen studies that included 7,873 incidences of colon and rectal cancer in men and women were reviewed. Findings show that LTPA was associated with colon cancer but not rectal cancer and modest risk reduction was reported for both men and women (RR = 0.80; P= 0.02 RR= 0.86; P=0.03 respectively). Although the authors concluded that the rate of colorectal cancer is unlikely to be highly impacted by LTPA, careful consideration must be given based on lack of use of a standardized instrument. [54]

2.1.4.2 Breast Cancer

Evidence that PA is beneficial in preventing or reducing breast cancer is demonstrated in a 2007 systematic review of sixty-two studies evaluating breast cancer and PA. Seventy-six percent of the studies showed significant risk reduction for cancer. More specifically, women who participated in PA had an average decrease in breast cancer of 25-30% (RR=1.5). These findings are supported in a relevant expert opinion statement given by Newton and Galvao,

which endorses the conclusive evidence of the positive effects of PA on the occurrence of breast cancer. [55]

2.1.4.3 Gynecological Cancer

Physical inactivity is a potential modifiable risk factor for certain gynecological cancers. According to a study conducted in 2008, it was suggested that a 20-30% lower risk for endometrial cancer and a 20% lower risk for ovarian cancer was identified in women who participated in the highest levels of PA compared to those who were sedentary. The evidence for the effects on cervical cancer is mixed. [56]

An inverse relationship between PA and cancer is substantial enough for the American Institute of Cancer Research (AICR) to develop PA guidelines of 30-60 minutes of moderate to vigorous PA four days per week or 20-30 minutes of vigorous activity at least 3 days per week for cancer risk reduction. [57] The overall recommendation for cancer prevention is to maintain regular PA throughout life. [35]

2.2 PARTICIPATION IN PHYSICAL ACTIVITY

It is hypothesized that humans are dying because of a lack of physical exercise. [35] Despite the evidence supporting PA and health risk reduction, fewer than half of adult Americans are physically active on a regular basis. Increased computer usage, video gaming, reading, environmental factors (urban sprawl, lack of sidewalks and other areas for recreation), low physically demanding occupations, time spent watching TV, and time spent riding in a car have

resulted in low energy expenditure and contributed to the rise in sedentary behavior over the last few decades. [35, 44, 58]

Sedentary behavior commonly increases with age and is often greater in women versus men. [35] Contributing factors influence differences in PA participation. A systematic review by Rhodes et al. suggests that socio-demographic influences, gender, age, ethnicity, employment type, and occupation play a role in PA status. Cognitive factors including attitude, depression, and life satisfaction have also been considered. This systematic review concluded that standardized measures to assess sedentary behavior are warranted. [44]

Various health initiatives have been established to increase PA among the population. According to the American College of Sports Medicine, a cumulative effect of 30-60 minutes of moderate to vigorous cardiovascular activity (may be achieved in 10 minute increments) per day is currently recommended to achieve health benefits. In addition, resistance training for each major muscle group on 2 non-consecutive days per week and flexibility and balance training are advised. [37] Achievement of these goals can be accomplished through structured, leisure time, lifestyle, and/or occupational activity. The benefits of exercise are clear and should be promoted to improve health and reduce the risk of morbidity and mortality.

2.3 HEALTH COUNSELING FOR BEHAVIOR CHANGE

Health counseling for behavior change involves a set of complex components that are not well defined. Many theoretical frameworks have been used to explain and define the most effective counseling approaches to behavior change. [63, 85, 87] Recent systematic review and meta-analysis

results will be discussed to give support for effective evidence-based counseling behavior recommendations.

A 2008 meta-analysis examination of 122 studies involving a total of 44, 747 participants investigated whether there were similar components of effective behavior change interventions identified among heterogeneous interventions. [87] Two types of studies were included, healthy eating (HE) and physical activity (PA) interventions.[88] Meta-regression analysis detected significant differences in behavior change interventions compared with control conditions (pooled effect size of .31 [95% CI-0.26 to 0.36]).

Significantly greater effectiveness was noted for self-monitoring in combination with at least one other technique from control theory (goal setting, behavior monitoring, receiving feedback, and re-evaluation of goals) compared to self-monitoring alone (pooled effect HE 0.54 vs. 0.24; PA 0.38 vs. 0.27; all interventions 0.42 vs. 0.26). In addition, content of the intervention was deemed to be important to effectiveness, whereas intervention design, behavioral target, and the number of behavioral change techniques did not contribute to effectiveness.[87]

Similarly, in 2010, a systematic review was conducted to examine effective health-promotion behavior change techniques identified for healthcare professionals. This study reported on 23 systematic reviews of smoking cessation, HE and PA interventions. Self-monitoring, risk communication, and social support were identified as effective most frequently (56%, 52%, 50% of the studies, respectively), however, heterogeneity among studies could have been influential and clear effects were not convincing. Low overall success rates are possibly attributable to the inclusion of smoking cessation studies.[63]

In summary, heterogeneity of studies makes it difficult to identify the most effective techniques for patient counseling across studies. Effective interventions using self-monitoring and at least one other technique from the control theory is hypothesized to improve outcomes for HE and PA.[87] In addition, consideration should also be given to action control, using social influences, and awareness.[63]

2.3.1 Health Counseling in the Non-hospital Setting

Individual behaviors, such as smoking, poor nutrition, alcohol consumption, and lack of physical activity (SNAP risk factors) contribute to chronic preventable health-related conditions. [2, 8, 61] Chronic conditions associated with individual behaviors are predicted to reach 157 million by the year 2020.[8] Addressing health risks is in compliance with public health initiatives and healthcare providers are in a position to guide behavior through health counseling. [2, 8, 10, 62, 63]

Nearly 80 percent of adult Americans visit their HCP at least once per year for treatment of acute conditions, chronic conditions, and to obtain recommendations related to health promotion and wellness behaviors. [2, 27, 62] HCP's are considered an influential source of health information, providing preventive counseling to impact the incidence of chronic diseases associated with individual SNAP risk factors. Patients who receive behavior change interventions from a HCP are more likely to engage in healthy behaviors, yet these interventions occur at a lower than expected rate. [2, 8, 35, 63, 64] Behavioral counseling routinely occurs for smoking and alcohol consumption but less frequently for nutrition and PA. [2] Given the evidence that nutrition and PA are significant factors in the reduction of chronic disease, morbidity, and mortality, it is important to increase the effort to provide counseling on these factors. [35]

To support the correlation between HCP-delivered counseling and improved patient outcomes through PA, research conducted in 2009 examined 266 participants in a study conducted in the primary care setting evaluating an intervention of comprehensive counseling (CC) compared to standard care (SC). [59] The study examined African American women aged 35 or older at high risk for cardiovascular disease (CVD). The CC intervention recommended leisure time PA (LTPA) and provided counseling about dietary fat intake; the standard care group did not receive recommendations about LTPA. Participants receiving CC showed greater increases in LTPA at 6 months (OR= 3.82, CI 1.41, 10.3) in comparison with participants receiving SC. [59] In addition, dietary risk assessment scores were lower in the CC group than the SC group at 6 months and 12 months (-8.50 vs. -5.34 and -7.16 vs. -3.37 respectively). [59] These findings suggest that CC can have a greater impact on health outcomes than SC alone.

In a similar study, the WISEWOMAN project evaluated an intervention in primary care targeting HCP (nurse practitioner) counseled participants to increase moderate to vigorous levels of activity by 10 minute increments over time to reach 150 or more minutes weekly. Data was collected on 217 low income uninsured sedentary primarily Hispanic women greater than 50 years of age. Participants significantly improved activity levels at 1 year regardless of the intervention, counseling alone (PC), PC with health education (PC + HE)), or PC + HE with follow up from a healthcare worker (PC + HE + HCW) ($p \leq 0.01$, $p \leq 0.05$, $p \leq 0.01$ respectively). [60] The combined findings of these studies demonstrate that HCP counseling is influential on improving PA. Positive clinical outcomes have been witnessed in the primary care setting and advancing the reach of PA counseling is warranted.

2.3.2 Effectiveness of physician delivered physical activity interventions

The primary care setting is a unique setting for HCP's to deliver PA counseling and primary care providers (PCP's) can play a key role in PA promotion. [62, 78] The Institute of Medicine recommends that PCP's should address PA as a health risk factor for all patients. Since many patients visit their PCP's at least once per year, with typical patient visits occurring at least 3 times annually, PCP's are in a position to positively influence PA behavior changes. [20, 62, 65, 66]

Patient-related behavioral change can result when PCP's convey positive attitudes toward PA and when PA counseling is provided during PCP encounters; however, suboptimal PA counseling occurs. Results of self-reported data indicate that fewer than 50% of PCP's provide PA counseling to adult patients in the United States. [10] A cross sectional study by Douglas et al. surveyed 757 primary care staff about their knowledge, attitudes, and current practices of advising patients about PA.[10] There was a 54% response rate of self-reported data showing that less than half of PCP's regularly counseling about PA in the primary care setting.[10]

When U.S. PCP's were surveyed about practices of managing overweight and obesity through diet, PA, and weight control treatment of adult patients with and without chronic disease, there were similar results. [20] Survey results from 1211 PCP's from the American Medical Association Masterfile were compiled in regard to assessment, counseling, referral, and follow-up of diet, PA, weight control, and pharmacologic and surgical referral for overweight and obesity. There was a 64.5% response rate. Counseling was reported as "always" for 39-49% of patients with chronic weight-related diseases and 21-30% for patients without weight-related chronic diseases. In the same study, a comparison of PA recommendations, dietary intervention, or weight control disease management, showed that PA recommendations were given to patients

with weight-related diseases by approximately half of PCP's, diet recommendations by 43.4% of PCP's and weight control recommendations were given by 38.7% of PCP's. [20] While assessment of diet and PA was performed in some manner by 80% of respondents, recommendations regarding diet, PA, and weight control were reported by less than half of PCP's surveyed, indicating that there is room for improvement.

2.3.3 Effectiveness of nurse practitioner delivered physical activity interventions

Nurse practitioners (NP's) act as primary care providers (PCP's) and, like physicians, are ideally positioned to provide PA recommendations to patients. Current public health initiatives identify the need for improved patient-provider PA counseling to occur.[67] Since NP's are frequently assuming PCP roles, they are in a position to improve PA counseling by implementing the core competencies of NP practice to provide health promotion and disease prevention through counseling and education. [21, 67, 68]

In a survey of 606 NP's assessing the practice patterns, knowledge, and confidence for prescription of PA, Burns et al. reported that 49.6% of NP's counseled patients about PA on most days of the week. [79] In a similar cross-sectional study evaluating the health promotion attitudes of 727 Texas NP's, Reeve et al. reported that 58% of NP's provide PA counseling.[68] Since the Healthy People 2010[20] projected goal for PCP PA counseling is to achieve an 8.5% increase in PA counseling, a need for additional intervention exists. As a result, exploration of PA counseling by PCP's, as well as other HCP's is suggested to improve PA outcomes in primary care.

2.3.4 Effectiveness of physical therapist- delivered physical activity interventions

The physical therapist (PT) is an allied health professional who provides active physical rehabilitation, counseling and patient education for health promotion. [69, 70, 71] Health promotion addresses the concepts of minimizing or eliminating the cause of disease instead of focusing on treating illness or symptoms of illness. [70] PA counseling in the PT setting is likely to expand the reach of HCP-delivered interventions to reduce sedentary behavior in adults. [71]

Studies evaluating PA counseling in the PT setting are limited; however, in a 2008 survey of 321 PT's, more than 95% reportedly consider PA counseling as important.[80] When evaluating clinical practice behaviors of 417 PT's, Rea et al. reported qualitative analysis of the practice patterns, self-efficacy, and outcome expectations. The results indicate that PT's provide PA counseling to patients 54% of the time and are more likely to do so when the PT has a higher level of self-efficacy. [71] Nearly half of PT encounters do not address PA, further demonstrating that the goals of PA counseling are not being achieved. Investigation of PA counseling in clinical practice among PT's and other HCP's is warranted.

2.3.5 Effectiveness of registered nurse-delivered physical activity interventions

PA is essential to health. Assessing PA is suggested as the 5th vital sign and should be addressed routinely in clinical practice.[1, 23] Patient counseling about PA occurs with HCP's who are directly involved in patient counseling, including MD's, NP's, and PT's. It is essential to develop a comprehensive approach toward addressing PA counseling in the clinical setting.[18] A gap still exists and reducing the gap through exploration of the role of the RN is suggested.

In accordance with the definition of nursing, the practice of RN's is to diagnose or treat human responses to actual or potential health problems through health counseling and health teaching.[72] There are more RN's than any other group of HCP's in the United States and RN's reportedly spend more time with patients than other HCP's. [26] RN's have effectively impacted patient outcomes in cardiac rehabilitation, diabetes, and hypertension management and it is worthwhile to examine the role the RN can have in PA counseling. [30, 32-34, 73, 74] Although there is a paucity of studies which focus on RN-delivered PA counseling, current research provides evidence that health promotion is within their scope of practice, and RN's may be effective PA behavior change agents. [75, 76]

Cardiac rehabilitation is an area that has provided positive evidence that RN's can be effective change agents. In a study of a nurse-led cardiac rehabilitation program, Jiang et al. reported that an RN-led intervention showed improvements in the performance of PA in a sample of 167 cardiac rehab patients. When comparing 2 groups, a care as usual group and a group which received care as usual plus an RN-led intervention of education, support, supervision, and reinforcement of self-management of cardiac rehabilitation, results for the intervention group showed a significantly improved walking performance and diet improvement at 3 months ($p<0.001$) and 6 months ($p<.01$) compared to the care as usual group. [33]

RN's have also been effective change agents in hypertension management. Drevenhorn describes a RN-led lifestyle intervention which demonstrated a significant reduction in average levels of systolic blood pressure from 141.9 to 137.5mm Hg ($p=.015$) and a non-significant reduction in diastolic blood pressure in patients who received counseling from the RN. [34] This study showed that a RN-led intervention contributed to relevant results for women in regard to overall hypertension management, including significant weight loss ($p=0.005$), PA participation

(p=0.035) and a change in medication for blood pressure control (p<0.001).[34] Upon review of the impact that RN's have had for cardiac rehabilitation, diabetes, and hypertension management, the assumption is that RN's could also significantly affect PA in a clinical setting, thereby reducing the existing gap in PA counseling provided by HCP's. [34]

An investigation of diabetes self-management counseling provided by RN's was conducted in a systematic review in 2007. Twenty-two studies were reviewed which included descriptive studies, randomized controlled studies, and intervention studies. The systematic review implicated that RN interventions were effective for patients with diabetes by providing education, incorporating individualized care, assuring patient safety, offering self-care promotion, and providing guidance in learning the physical skills, as well as providing psychological support for patients with diabetes. Specific outcomes noted were improved glycemic control, improved diabetes-related symptoms, decreased lengths of stay in the hospital and reduced financial impact through nurse-led care. Despite heterogeneity of the 22 various studies reviewed, results demonstrated that RN's are relevant to education and promotion of self-care.[32]

Although RN's have training as patient counselors, reported barriers interfere with effective RN-led counseling for PA. Barriers such as time constraints, higher priority acute health-related needs of patients, and lack of knowledge often interfere with preventive PA counseling. Research examining the attitudes, beliefs, and practices of registered nurses show that RN's are more likely to counsel about PA if they participate in PA and have a high level of self-efficacy [26, 75], yet it is unclear which factors influence RN-led PA counseling in clinical practice. It is the intention of this study to assess the factors which influence the PA counseling

behaviors of non-hospital based RN's in order to use the results to design interventions which focus on PA health counseling for RN's.

2.3.6 Current Primary Care Physical Activity Recommendations

Although the evidence for PA on CVD risk reduction exists, counseling to improve PA to reduce CVD risk is not highly recommended at the current time.[85, 86] Recommendations issued by experts based on the most current scientific evidence for physical activity counseling were published by the United States Preventive Services Task Force (USPSTF) in 2012.[86] Due to the high investment of time required by the HCP and the relatively small health benefit realized by a subgroup of clients, a recommendation of Grade C (recommended for some individuals) by the USPSTF has been applied to counseling on PA in the primary care setting. Some individuals will benefit more than others from PA health counseling and HCP's are encouraged to apply these recommendations with discretion. PA counseling may be worthwhile for those patients who may benefit most as evidenced by their readiness to change and the necessary support systems and resources available to them.[85]

Recommendations by the USPSTF resulted from a meta-analysis of fifty eight studies updating previous recommendations on PA and dietary counseling in primary care. All of the studies examined healthy disease-free low-risk individuals and the benefits of PA and diet counseling. Results of measurable health and behavioral outcomes support earlier findings that PA and dietary counseling could have relevant contributions in the improvement of CVD risk status, including a reduction in blood pressure and lower cholesterol. However, interventions of statistical significance required medium (31-360 minutes) to high intensity (>360minutes) counseling and were noted for some but not all outcomes. Statistical significance was noted for

reduction in systolic blood pressure (SBP) (weighted mean difference -1.87mmHg [95% CI, -3.24 to -0.50]; I=2.7%; k=4; N=1.104), but was minimal and not statistically significant in long term follow up at 24 and 54 months. Statistical significance was noted for improved total cholesterol, LDL, and/or triglycerides at 18 and 54 months (k=11; N=2,637; k=10; N-2,312; k=9; N=2,110, respectively) but also required high intensity intervention. [85, 86]

In consideration of the investment of time by the HCP, the duration of effectiveness of the intervention, the small subgroup benefit, and the heterogeneity of studies, the USPSTF has given a C level recommendation for PA counseling in the primary care setting. The HCP in the primary care setting should provide PA counseling to those who would benefit most. [85, 86]

Thus, despite the C-level recommendation by the USPSTF, physical activity has been shown to significantly reduce morbidity and mortality resulting from chronic disease associated with inactivity. The nurse is an important individual within primary care, and therefore may play an important role in physical activity counseling. Findings from this study be informative about factors that contribute to the nurse's role in physical activity counseling, and how to improve physical activity counseling that is provided by nurses.

3.0 RESEARCH METHODS

3.1 INTRODUCTION

Improving PA is a public health priority. Regular participation in PA is correlated with improvements in cardiovascular conditions, diabetes, reductions in overweight and obesity, decreased risk for cancer, improved emotional and psychological status, and arthritis. RN's may have the potential to influence PA participation. Results from this study will provide valuable information on the factors which contribute to RN-led PA counseling in the non-inpatient settings.

3.2 RESEARCH DESIGN

A cross-sectional descriptive study was conducted to examine primary care RNs' counseling behaviors, self-reported knowledge of current physical activity (PA) recommendations, the degree which RN's prioritize counseling on PA compared to other health risk behaviors, the barriers which interfere with RN-led PA counseling, and the self-efficacy and personal behavior of the RN related to PA. A survey was utilized to obtain data from individual RN's specific to the aims identified in Chapter 1.

3.3 SUBJECTS

This study recruited 117 RN's from the Pennsylvania State Board of Nursing. Eligibility criteria included RN's who currently practice in a primary care setting, home care, or public health and who currently have patient contact in the clinical setting are eligible to participate. Exclusion criteria included RN's who are currently employed to work primarily in an academic setting (School of Nursing or other academic setting), inpatient hospital, nursing home, personal care home or rehabilitation setting. Inclusion and exclusion criteria were confirmed based on self-report.

3.4 RECRUITMENT AND SCREENING

Initially, RN's identified through a listserv from the Pennsylvania State Board of Nursing who reside in Allegheny County were invited to participate in the study. There are approximately 21,000 RN's residing in Allegheny County who were available through the Pennsylvania State Board of Nursing. Because the list did not differentiate RN by specialty, this study randomly selected 2,000 RN's from this list of 21,000 to receive an invitation to participate in this study. These RN's were invited to participate in this study according to the Total Design Method (TDM), a systematically scheduled process for questionnaire survey research.[84] The TDM has repeatedly demonstrated questionnaire return rates of >70%, therefore, it was anticipated that the recruitment goal would be achieved. [84] A modified TDM model was used to accommodate completion of the online survey.

An invitation letter mailed to RN's (Appendix A) invited the RN's to electronically access a full introduction letter and the questionnaire survey (Appendix C). The introduction letter described the length of the study, the tasks involved, the information necessary to complete the study, the process for maintaining confidentiality, and the voluntary nature of the study. Informed consent was in accordance with the process established by the Institutional Review Board (IRB) of the University of Pittsburgh. This study consented eligible individuals electronically, which eliminated the need for an in-person visit and facilitated participation in this study. Individuals were notified that informed consent could be withdrawn at any time. If the RN responded with interest he/she was provided access to the Survey Monkey link that allowed for the completion of the survey instrument for this study. Eligibility criteria were established by self-report of the second and third questions of the survey. The questionnaire was set to terminate if the RN worked in a setting that was not primary care, home care or public health or if the RN's current position did not involve patient care. The RN's were instructed to enter a uniquely assigned study code into the survey so that responses were de-identified, yet the investigator was able to determine which RN's had completed the survey according to their unique code. This minimized the need for additional recruitment mailings to these RN's who already responded. One week and two weeks after the initial invitation letter was mailed, follow up postcards were mailed to non-responders. A reminder postcard was planned to be mailed at weeks 7 and 10, however, low rate of return and the cost of mailings resulted in termination of this recruitment strategy at the end of week 4. The intended sample size was 200 and this recruitment strategy did not reach intended goals. Thus, additional recruitment strategies were implemented at week 5. A list of non-hospital based RN's, identified as "practice RN's" by the human resources department through the University of Pittsburgh Medical Center (UPMC) was

queried. On week 7, an electronic recruitment letter was sent through the human resources department of UPMC to an internal listserv of the nurses queried. Although the RN's were from a broader geographic range than just Allegheny County, Pennsylvania, this source of recruitment was considered since these RN's were more likely to be eligible to participate due to employment practice setting. There were approximately 494 RN's from practices throughout Pennsylvania who were electronically mailed the survey recruitment letter. A follow up reminder post card was electronically mailed to UPMC nurses through the human resources department of UPMC on week 9. In order to accurately track the number of RN's recruited via this recruitment strategy, the recruitment letter and the follow up postcard contained an identification code of *9999*. Recruiting RN's via UPMC practice settings produced a response rate of 21%.

Another recruitment strategy was implemented at week 9. The Pennsylvania State Nurses Association (PSNA) District 6 was used to recruit PSNA members who were residents of Allegheny County, as identified by zip code of residence. The recruitment letter was electronically mailed letter to 215 members of PSNA. A follow up reminder was sent 1 week later. In order to accurately track the number of RN's recruited via this recruitment strategy, the recruitment letter and the follow up postcard contained an identification code of *8888*. This recruitment strategy produced a response rate of zero.

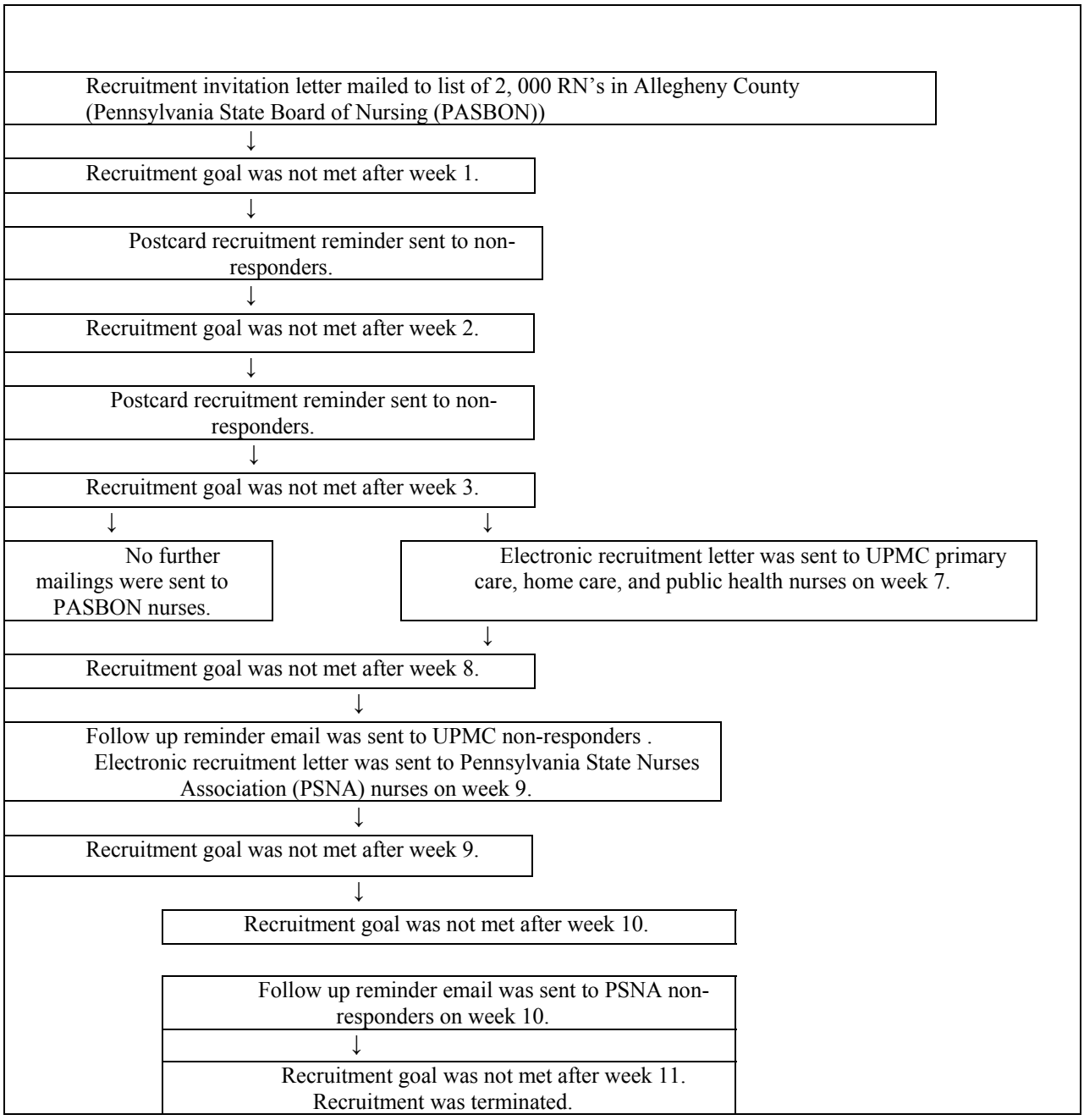

Figure 1. Illustration of Recruitment Flow.

3.5 SURVEY

A questionnaire survey (Appendix C) was adopted from two recent studies examining PA counseling among healthcare workers. [10, 81] Questions were modified for applicability to RN's who do not work in an inpatient setting. The survey included demographic data, self-reported counseling behaviors, counseling behaviors specific to PA, prioritization of counseling on PA among other lifestyle behaviors, perception of health promotion as an important part of work, belief that it is important to counsel about PA, perception of personal self-efficacy of counseling on PA, self-reported practices on counseling about PA, knowledge of the PA recommendations for health, the knowledge level of the 2008 Physical Activity Guidelines for Americans, barriers to PA counseling, and personal PA behaviors. Demographic data included information about gender, age, race, level of initial RN training, highest level of nursing education, years of experience in primary care, home care, or public health, and self-reported assessment of personal activity.

3.6 SURVEY RESPONSE RATE

Recruitment occurred via mail to 2000 randomly selected RN's in Allegheny County, Pennsylvania as identified by the Pennsylvania State Board of Nursing (SBON). In a recent study of critical care RN's a sample of 200 RN's was able to be recruited in an inpatient setting, and therefore the minimum recruitment target for this current study was set at 200 RN's.[81] Although response rates to surveys reported in the literature have been as low as 15%, it was

anticipated that use of the Total Design Method (TDM) of questionnaire research would facilitate a greater response rate.[84]

The source was chosen for accessibility and range of representativeness of RN's. Thus, it was anticipated that a random sample of the 2,000 RN's in Allegheny County would provide a sufficient and representative sample of RN's who met the eligibility criteria for inclusion in this study. However, the randomized list of RN's recruited from the PSBON was not specific to primary care and included RN's from all practice areas. Allegheny County has the highest number of RN's in Pennsylvania, but also has the largest number of hospitals in Pennsylvania.

3.7 DATA MANAGEMENT

All survey data was collected through the Survey Monkey website which houses data in an offsite secure location. All data retrieved by the principal investigator was verified and stored in a locked storage area at the University of Pittsburgh. Data was accessible only by the researchers involved. Upon completion of data collection and prior to data analysis, all identifying coding information was removed to de-identify survey responses.

Survey questions were intended to collect data on each specific aim as follows:

a. Questions 13 and 14 on the survey were used to examine the counseling behaviors of RN's related to health risk behaviors (Specific Aim 1).
b. Questions 15, 16, and 18d, 18f, and 18g on the survey were used to examine the counseling behaviors of RN's related to physical activity behaviors (Specific Aim 2).
c. Question 19, 20, 21, and 22 were used to assess self-reported knowledge of physical activity recommendations, and the product of Questions 20 and 22 will be used to

represent the amount of physical activity that the RN recommends for physical activity (Specific Aim 3).

d. Question 17 was used to examine the degree which RN's prioritize counseling patients on physical activity compared to health behaviors (smoking, nutrition, and alcohol) (Specific Aim 4).

e. Question 23 was used to examine the barriers reported by RN's when counseling about PA (Specific Aim 5).

f. Question 18c was used to examine the self-efficacy that RN's report related to physical activity (Specific Aim 6).

g. Questions 6 (level of training/education), 8 (years of nursing experience), 9 (years of nursing experience in primary care, home care, or public health), and 25 and 26 (self-reported personal physical activity) were used as grouping variables for Exploratory Aims 1-4, with responses to Questions 13, 14, 15, 16, 17, 18c, 18d, 18f, 18g, 19, 20, 21, 22, and 23 used as dependent variables in these analyses. For self-reported personal physical activity, number of days exercised and number of minutes per day exercised were used to compute minutes of exercise per week.

Additional questions on the survey were used as descriptive variables.

3.8 STATISTICAL ANALYSIS

Collected data was statistically analyzed using the statistical package for the social sciences (SPSS) (version 19.0, IBM Corp, Armonk, NY). Descriptive data was reported for demographic and background information. Descriptive analyses were used to determine quantitative

description of the data. Charts and graphs display the descriptive data of the sample of participants.

Descriptive statistics evaluate the sample of RN's. Frequency and percentages were calculated for age, gender, race, ethnicity, practice setting, initial professional training, years of experience in nursing practice, years of nursing in primary care, home care, or public health practice, working status (e.g. full time, part-time, casual), highest degree of nursing education, whether RN's counsel on health behaviors and whether RN's counsel on physical activity.

Specific aim 1 was examined with frequency and percentages reported for the number of RN's who perform individual counseling behaviors. Specific aim 2 was examined with frequency and percentages reported for the number of RN's who perform physical activity counseling behaviors. Specific aim 3 was examined frequency and percentages calculated for knowledge level of physical activity recommendations. Means and standard deviations were calculated for Specific Aim 4 which evaluated the degree which RN's prioritize counseling patients on physical activity. Specific Aim 5 was examined with frequency and percentages reported for the identified barriers to physical activity counseling. Specific aim 6 was examined with frequency and percentages reported for the number of RN's who currently exercise. Kruskal Wallis comparisons were made for Exploratory Aims 1-6. This allowed for examination of whether there was a significant difference on the RN's knowledge of the amount of physical activity that is recommended for health, the degree to which the RN's prioritize counseling patients on physical activity compared to health behaviors (smoking, nutrition, and alcohol), the barriers that exist that interfere with RN's counseling about PA, or the self-efficacy that RN's report related to physical activity among the level of training of the RN (i.e., Associates Degrees, Bachelor of Science in Nursing, Master of Science in Nursing) (Exploratory Aim 1), years of

experience in primary care, home care or public health, (Exploratory Aim 2), years of nursing experience (Exploratory Aim 3), or self-reported personal physical activity (Exploratory Aim 4), the barriers that exist that interfere with RN's counseling about PA (Exploratory Aim 5), the self-efficacy that RN's report to physical activity (Exploratory Aim 6).

If significant differences were identified, ANOVA group comparative statistics were used to find the level of difference. If the assumptions of ANOVA were not met, Kruskal-Wallis group comparative statistics were used to evaluate differences within groups.

4.0 RESULTS

The purpose of this study was to examine the counseling behaviors of non-hospital based registered nurses (RN's) related to physical activity counseling. Specifically, this study was to describe self- reported data in regard to: counseling behaviors of RN's related to health risk behaviors (smoking, nutrition, alcohol, etc.); counseling behaviors of RN's related to physical activity behaviors; the knowledge level of RN's regarding the amount of physical activity (PA) that is recommended for health; the degree to which RN's prioritize PA counseling compared to other health behaviors (smoking, nutrition, alcohol, etc.); the barriers that interferes with RN's counseling about PA. Exploratory analyses were also conducted to examine the influence of RNs' level of training, years of nursing experience, years of experience in primary care, home care, or public health, and self-reported behavior on these outcomes.

4.1 SUBJECT CHARACTERISTICS

Letters of recruitment for survey participation were initially mailed to 2000 randomly selected RN's from the Allegheny County, PA. The list of RN's was obtained from the Pennsylvania State Board of Nursing (SBON). Initially, the pool of RN's was randomly selected from a listserv of 21,000 RN's from Allegheny County since this county has the largest RN population in the state of PA[91]. Initial recruitment letters were sent to all 2000 RN's on week 1, and follow

up letters were sent to non-responders on weeks 2 and 3. However, as a result of low response rate to this recruitment strategy, the pool of RN's recruited was expanded to include email recruitment of RN's from the University of Pittsburgh Medical Center (UPMC) practice settings and the Pennsylvania State Nurses Association (PSNA) listserv of primary care RN's from Allegheny County. The surveys were accessed by the RN's via a survey link which was typed into a browser by the RN. The overall pool of RN's who accessed the study was 344, of these, 117 were eligible for the study, yielding an eligibility rating of RN's of 34%. Approximately 45 (38%) of the eligible respondents were from the SBON listserv, 72 (62%) of the eligible respondents were from UPMC practice settings, and 0 were from the PSNA listserv. For analysis purposes, the PSNA has been eliminated. Recruitment will be referred to as "recruitment setting" for demographic analysis purposes: SBON and UPMC. Additional analyses will refer to the overall pool of RN's. Table 1 provides a summary of the surveys completed by each subgroup according to recruitment setting within the pool of RN's included in this research study.

Table 1. Survey Completion Rates Based on Recruitment Strategies

Source of Recruitment	Number of Number of RN's Contacted to Participate	Number of RN's Accessing the Survey	Number of RN's Competing the Survey	Percent of RN's Completing the Survey Relative to the Number of RN's Contacted to Participate
Pennsylvania State Board of Nursing (Direct Mai)	2000	224	45	2.25%
University of Pittsburgh Medical Center Clinical Practices (Direct Email)	494	120	72	14.6%
Total	2494	344	117	4.7%

Table 2 provides a summary of the demographic characteristics of the 117 respondents who completed surveys. There were no significant differences noted among the SBON compared to the UPMC respondents in regard to demographic characteristics. The majority of respondents were Caucasian (n=43; 96%); (n=67; 93%) and female (n=42; 93.3%); (n=68; 94.4), aged 51-60 years (n=18; 40%); (n=31; 43.1%) (SBON and UPMC, respectively). All of the respondents from the SBON were older than 25 years of age. There were only 2 (2.8%) from the UPMC group who were younger than 25 years, all others were older than 25. There were 6 respondents from SBON (13.3%) and 1 from UPMC (1.4%) who were older than 60 years of

age. The remaining respondents were between 31 and 50 years of age (n=18; 40%); (n=31; 43%).

Table 2. Demographic Characteristics of Respondents: Comparison by Recruitment Method

Variable	Total combined participants from SBON and UPMC		Number of Participants from SBON		Number of Participants from UPMC		*p-value
	N	%	N	%	N	%	
Age (N=116)							.067
<25 y	2	1.7%	0	0%	2	1.7%	
25-30y	9	7.8%	3	2.5%	6	5.1%	
31-40y	23	19.8%	11	9.4%	12	10.3%	
41-50y	26	22.2%	7	6.0%	19	16.3%	
51-60y	49	42.3%	18	15.5%	31	26.7%	
≥60y	7	6.2%	6	5.1%	1	0.8%	
Total	116	99.1%	45	38.7%	71	61.2%	
Missing	1	0.8%	0	0%	1	0.8%	
Gender (N=116)							.563
Female	110	95%	42	36.2%	68	58.6%	
Male	6	5%	3	2.5%	3	2.5%	
Total	116	99.1%	45	38.7%	71	61.2%	
Missing	1	0.8%	0	0%	1	0.8%	
Ethnicity: Hispanic/Latino/Puerto Rican/Cuban/Latin American Descent (N=115)							.751
Yes	2	1.7%	1	0.8%	1	0.8%	
No	113	96.6%	44	37.9%	69	59.4%	
Unknown	0	0%	0	0%	0	0%	
Total	115	98.3%	45	38.8%	70	60.3%	
Missing	2	1.7%	0	0%	2	1.7%	
Race (N=115)							.112
White	110	96%	43	37%	67	57.7%	
Black African American	2	1.7%	2	1.7%	2	1.7%	
Other	2	1.7%	0	0%	0	0%	
Total	115	98.3%	45	38.7%	69	59.4%	
Missing	3	2.6%	0	0%	3	18.7%	

Table 3 provides a summary of the professional training characteristics of the respondents. Significant differences were noted between the SBON and UPMC respondents for

highest degree of education only (X^2=14.572; df=5; ρ=.012). There were more respondents from SBON who pursued a master's degree (n=7; 15.6%) or doctoral degree (n=3; 2.5%) compared to only 3 (4.2%) from UPMC who had a master's degree, while none of the UPMC respondents pursued training at the doctoral level. Similarity was noted among respondents from the SBON and UPMC regarding initial levels of training with the majority of respondents in both groups initially prepared with an associate's degree (n=17; 37.8%); (n=26; 36.1%), followed by bachelor's degree (BSN) (n=17; 37.8%); (n=23; 32.9%), and the remainder initially prepared with a diploma (n=11; 24.4%); (n=21: 30%) (SBON and UPMC respectively).

Table 3. Nurse Education of Respondents: Comparison by Recruitment Method

Variable	Total Combined Participants from SBON and UPMC		Number of Participants from SBON		Number of Participants from UPMC		*p-value
	N	%	N	%	N	%	
Initial RN Training (N=117)							.780
Diploma	32	27.3%	11	9.4%	21	17.9%	
Associates Degree	43	36.6%	17	14.5%	26	22.2%	
BSN	40	34.1%	17	34.1%	23	19.6%	
Total	117	100%	45	38.4%	72	61.5%	
Missing	0	0%	0	0%	0	0%	
Highest Degree of Nursing Education (N=117)							.012
Diploma	20	17.2%	3	2.5%	17	14.5%	
Associates Degree	26	22.3%	8	6.9%	18	15.3%	
BSN	57	49%	24	20.5%	33	29.2%	
MSN	10	8.6%	7	5.3%	3	2.5%	
DNP	1	0.9%	1	0.9%	0	0%	
PhD	2	2%	2	2%	0	0%	
Total	117	100%	45	39.4%	72	61.5%	
Missing	0	0%	0	0%	0	0%	

*** p-value for chi square comparing SBON and UPMC**

Table 4 demonstrates current practice setting (x2=.49.961; df= 2; p=.000) and current work status (x2=13.139; df=2; p=.001) of respondents. Most of respondents were employed full

time (SBON, n=26; 58%; UPMC, n=62; 86%) and more respondents from the SBON worked part time or casual (n=19; 42%) than those from UPMC (n=9; 12.5%). There was an apparent but non-significant difference in overall years of nursing experience between the SBON and UPMC respondents. While the majority of all respondents had more than 25 years of overall nursing experience (n=41; 41%), most of the SBON group had more than 5 years of experience (n=25; 61%) in primary care, public health, or home care while the majority of respondents from UPMC had less than 5 years of experience (n=31; 56%) in these fields of nursing.

Table 4. Nurse Work Experience and Work Characteristics: Comparison by Recruitment Method Chi Square Comparison between SBON and UPMC.

Variable	Total Combined Participants from SBON and UPMC		Number of Participants from SBON		Number of Participants from UPMC		*p-value
	N	%	N	%	N	%	
Years of Nursing Experience (N=114)							.058
<1y	2	1.7%	1	0.87%	1	0.87%	
1-5y	12	10%	4	3.5%	8	7.0%	
6-10y	21	18%	9	7.8%	12	10%	
11-15y	11	9.3%	2	1.7%	9	7.8%	
16-20y	20	17.2%	8	7.0%	12	10%	
21-25y	7	6%	3	2.6%	4	3.5%	
26-30y	10	8.6%	1	0.87%	9	7.8%	
31-35y	11	9.4%	7	6.1%	4	3.5%	
>35y	20	17.2%	10	8.7%	10	8.7%	
Total	114	100%	45	39.4%	69	60.6%	
Missing	3	2.6%	0	0%	3	2.6%	
Years of Nursing in Primary Care, Home Care, or Public Health (N=99)							.272
<1y	10	10%	3	3.0%	7	7.0%	
1-5y	37	37%	13	13.1%	24	24.2%	
6-10y	16	19%	6	6.0%	10	10%	
11-15y	8	8%	5	5.0%	3	3.0%	
16-20y	10	10%	2	2.0%	8	8.0%	
21-25y	6	6%	4	4.0%	2	2.0%	
26-30y	1	1%	1	1.0%	0	0%	
31-35y	4	4%	3	3.0%	1	1.0%	
>35y	4	4%	4	4.0%	0	0%	
Total	96	96.9%	41	41.4%	55	55.5%	
Missing	18	1.0%	1	1.0%	17	17.1%	
Work Status (N=117)							.001
Full Time	88	76%	26	22.2%	62	52.9%	
Part Time	19	16%	13	11.1%	6	5.1%	
Casual	9	7.8%	6	35.2%	3	2.5%	
Total	116	100%	45	38.4%	71	60.6%	
Missing	1	0.85%	0	0%	1	0.85%	
Current Practice Setting (N=117)							.000
Primary Care	82	70%	15	12.8%	67	57.2%	
Home Care	17	10%	17	14.5%	0	0%	
Public Health	18	20%	13	11.1%	5	4.2%	
Total	117	100%	45	38.4%	72	61.5%	
Missing	0	0%	0	0%	0	0%	

*** p-value for Kruskal Wallis comparison: SBON and UPMC**

4.2 COUNSELING BEHAVIORS OF RN'S RELATED TO HEALTH RISK BEHAVIORS: SPECIFIC AIM 1

Respondents were asked using a single item question whether they are encouraged to counsel about health risk behaviors within their health-care setting. Results showed that 81% (n=93) reported they are encouraged to counsel on health risk behaviors while 19% (n=22) of respondents are not.

Respondents were also asked to indicated the degree to which they perform specific health counseling activities using a 5-category response scale (very unlikely, unlikely, somewhat likely, likely, very likely). Table 5 summarizes the frequency and percentage of reported rankings on these behaviors. More respondents (n=89, 80.9%) were somewhat likely to very likely to "discuss intention to adopt new health behaviors with patients" than any other health counseling behavior. Whereas, "discuss goal revision" was ranked lowest among health risk counseling behaviors with only 58.1% (n=64) of respondents reporting that they were somewhat likely to very likely to counsel on this behavior. Results showed that 75.4% (n=88) of respondents were somewhat likely to very likely to advise patients to set health goals, 65.4% (n=72) to evaluate progress toward goals, and 63.6% (n=70) to advise patients to track goal achievement.

Exploratory aims of this study were to also examine the potential influence of level of nursing training, years of nursing experience, years of practice in primary care, home health care, or public health, and personal physical activity behavior on health behavior counseling strategies. These analyses showed non-significant influences of these factors on the physical activity counseling strategies that were reported by the nurses (data not shown).

Table 5. Frequency and Percentage of Respondents Reporting Counseling Behaviors in Regard to Health Counseling. (Specific Aim 1).

Variable	Very Unlikely		Unlikely		Somewhat Likely		Likely		Very Likely		Mean ± Standard Deviation
	N	%	N	%	N	%	N	%	N	%	
Discuss Intent to Adopt a New Behavior N=110	11	10%	10	9.1%	28	25.5%	38	34.5%	23	20.9%	3.47 (± 1.2)
Advise to Set Goals N=110	10	9.1%	17	15.5%	25	22.7%	33	30%	25	22.7%	3.41 (±1.25)
Evaluate Progress Toward Meeting Goals N=110	17	15.5%	21	19.1%	27	24.5%	29	26.4%	16	14.5%	3.05 (±1.29)
Advise to Track Goal Achievement N=110	17	15.5%	23	20.9%	27	24.5%	28	25.5%	15	13.6%	3.00 (±1.28)
Discuss Goal Revision N=110	18	16.4%	28	25.5%	26	23.6%	27	24.5%	11	10%	2.86 (±1.24)

4.3 COUNSELING BEHAVIORS OF RN'S RELATED TO PHYSICAL ACTIVITY BEHAVIORS: SPECIFIC AIM 2

There were 109 respondents who provided data on whether they are encouraged to counsel on physical activity in their current healthcare setting, 54% (n=59) of nurses are encouraged to counsel patients on physical activity and 46% (n=50) are not. Table 6 summarizes the amount of time spent on counseling adult patients regarding physical activity. Respondents provided data on the amount of time spent on physical activity counseling. Of the 90 people who responded to

this question, there were 4 (4.4%) respondents who counsel 100% of their patients on physical activity and 11 (12.2%) respondents who spend zero time on physical activity counseling. The majority of respondents (n=14, 55%) provide physical activity counseling to nearly 10% of adult patients, but 21 (23.3%) who counsel fewer than 10% of patients on physical activity. When asked to provide the amount of time per patient spent on physical activity counseling, 94 responded: 2 (2.1%) respondents provide 60 minutes per patient on physical activity counseling, 13 (13.8%) provide counseling for 10 minutes per patient, 12 (12.7%) spend no time on physical activity counseling, with the majority (n=34, 36.1%) counseling on physical activity for 5 minutes per patient.

Table 6. Amount of Time Spent on Counseling of Adult Patients on Physical Activity.

Variable	Mean ± Standard Deviation	Mode of Responses
Percentage of adults counseled on physical activity (N=90)	37.5 ± 32.35% of patients	10% of patients
Minutes per patient spent on physical activity counseling (N=94)	6.36 ± 8.9 minutes per patient	5 minutes per patient

Data were collected in regard to counseling strategies for physical activity behavior assessed on a 5-category response scale (very unlikely, unlikely, somewhat likely, likely, very

likely). Table 7 summarizes the frequency and percentages of responses. Of the counseling behaviors reported, 73% reported they were somewhat likely to very likely to both discuss the health benefits of physical activity (n=78) or to advise patients to walk more (n=78). Similar results were reported for discuss psychological benefits of physical activity, advise patients to be more physically active by doing housework, heavy gardening, etc., and advise patients to participate in moderate physical activity (n=66, 61.1%; n=63, 59.5%; and n=61, 56.5%, respectively). Whereas, only 38.4% (n=41) of respondents reportedly advise patients to participate in vigorous physical activity.

Exploratory aims of this study were to also examine the potential influence of level of nursing training, years of nursing experience, years of practice in primary care, home health care, or public health, and personal physical activity behavior on physical activity counseling strategies. These analyses showed non-significant influence of these factors on the physical activity counseling strategies that were reported the nurses (data not shown).

Table 7. Frequency and Percentage of Respondents Reporting Physical Activity Counseling Strategies. (Specific Aim 2).

Variable	Very Unlikely		Unlikely		Somewhat Likely		Likely		Very Likely		*Mean ± Standard Deviation
	N	%	N	%	N	%	N	%	N	%	
Discuss Health Benefits of Physical Activity N=107	14	13.1%	15	14%	22	20.6%	34	31.8%	22	20.6%	3.32 (±1.30)
Discuss Psychological Benefits of Physical Activity N=108	15	13.9%	27	25%	28	25.9%	20	18.5%	18	16.7%	2.99 (±1.29)
Advise to be More Physically Active by Doing Housework, Heavy Gardening, etc. N=106	17	16%	26	24.5%	22	20.8%	26	24.5%	15	14.2%	2.96 (±1.30)
Advise to Walk More N=107	15	14%	14	13.1%	19	17.8%	28	26.2%	31	29%	3.43 (±1.39)
Advise to Participate in Moderate Physical Activity N=108	20	18.5%	27	25%	28	25.9%	22	20.3%	11	10.1%	2.78 (±1.25)
Advise to Participate in Vigorous Physical Activity N=107	27	25.2%	39	36.4%	28	26.2%	11	10.2%	2	1.9%	2.27 (±1.01)

***1=very unlikely, 2=unlikely, 3=somewhat likely, 4=likely, 5=very likely**

4.4 RN'S KNOWLEDGE OF THE AMOUNT OF PHYSICAL ACTIVITY THAT IS RECOMMENDED FOR HEALTH: SPECIFIC AIM 3

Respondents were evaluated on their knowledge of current physical activity guidelines according to the Physical Activity Guidelines for Americans (PAGA). Respondents were asked 2 questions to evaluate their knowledge of physical activity recommendations: "the number of minutes per day" and the "number of days per week" of physical activity that are recommended for health. These values were combined to create the "number of minutes per week" of physical activity currently recommended by respondents. These data were used to determine if nurses recommended physical activity at a level that is consistent with the current PAGA recommendation. The current PAGA recommendation is "at least 150 minutes a week of moderate intensity physical activity."[17] Data for these responses are shown in Table 8. These data show that 60.2% of the nurses surveyed reported >150 minutes per week as the recommended amount of physical activity to improve health.

Table 8. Frequency and Percentage of Self-Reported Days per Week and Minutes per Day Physical Activity Recommended by Nurses Regarding Current Physical Activity Recommendations. (Specific Aim 3).

Variable	Frequency and percentage of nurses responding N=97	
According to the Physical Activity Guidelines for Americans, the number of days per week of moderate intensity aerobic physical activity recommended (N=98):		
At least:		
1 day/wk	2	2%
2 days/wk	2	2%
3 days/wk	43	44%
4 days/wk	11	12%
5 days/wk	36	36%
6 days/wk	0	0%
7 days/wk	4	4%
According to the Physical Activity Guidelines for Americans, the number of minutes per day of physical activity recommended is (N=97):		
0-10min/day	3	3%
11-20 min/day	7	7%
21-30 min/day	67	69%
31-40 min/day	3	3%
41-50 min/day	6	6%
51-60 min/day	11	11%
>60 min/day	0	0%
The number of minutes per week of physical activity recommended (combined minutes per day by days per week) is: (N=97)		
≤90minutes	13	13%
90-149 minutes	25	26.8%
150-209 minutes	41	42%
210-269 minutes	11	11%
≥270minutes	7	7.2%

Exploratory aims of this study were to also examine the potential influence of level of nursing training, years of nursing experience, years of practice in primary care, home health care, or public health, and personal physical activity behavior on knowledge level of physical activity recommendations (defined as at least 150 minutes of moderate to vigorous physical activity per week). As shown in Table 9, Kruskal-Wallis analysis indicated that none of these factors

significantly influenced the response to this query regarding the minutes per week of physical activity that should be recommended for health (data not shown).

Table 9. Relationship between Potential Factors Influencing RN's and Minutes per Week of Physical Activity That's Recommended for Health. (N=98)**

Factors Influencing Knowledge	Variable	Reported Minutes of Exercise Recommended for Health										*p-value
		<90		90-149		150-209		210-269		>270		
		Frequencies										
		N	%	N	%	N	%	N	%	N	%	
Level of Training (N=97)	Diploma	1	1.0 %	7	7.2%	7	7.2%	0	0%	1	1%	.390
	Associates Degree	4	4.1%	7	7.2%	12	12.3%	1	1.0%	1	1%	
	BSN	6	6.1%	21	2.0%	13	13.4%	4	4.1%	2	2%	
	MSN	1	1.0%	1	1.0%	5	5.1%	1	1.0%	0	0%	
	PhD	0	0%	0	0%	1	1.0%	1	1.0%	0	0%	
Years of Experience (N=97)	≤5	0	0%	8	8.2%	4	4.1%	0	0%	0	0%	.806
	6-10	1	1.0%	6	6.1%	6	6.1%	0	0%	2	2%	
	11-15	1	1.0%	4	4.1%	3	3.0%	1	1.0%	0	0%	
	16-20	2	2.0%	2	2.0%	9	9.2%	2	2.0%	0	0%	
	>20	8	8.2%	16	16.4%	16	16.4%	4	4.1%	2	2%	
Years of practice in primary care, home care, or public health (N=97)	≤5	7	7.2%	20	20.6%	18	18.5%	3	3.0%	2	2%	.727
	6-10	1	1.0%	6	6.1%	5	5.1%	0	0%	0	0%	
	11-15	1	1.0%	1	1.0%	3	3.0%	2	2.0%	1	1%	
	16-20	0	0%	3	0%	5	5.1%	0	0%	1	1.%	
	>20	3	3.0%	6	6.1%	7	7.2%	2	2.0%	0	0%	
Personal physical activity behavior (N=92)	≤100 minutes per week	8	8.6%	21	22%	17	18.4%	5	5.4%	0	0%	.117
	100-200 minutes per week	0	0%	4	4.3%	14	15.2%	2	2.1%	2	2.1%	
	201-300 minutes per week	1	1.0%	8	8.6%	2	2.1%	0	0%	1	1.0%	
	≥300 minutes per week	2	2.1%	3	3.2%	2	2.1%	0	0%	0	0%	

***Kruskal Wallis comparison **Not All respondents answered every question**

4.5 THE DEGREE WHICH RN'S PRIORITIZE COUNSELING PATIENTS ON PHYSICAL ACTIVITY COMPARED TO HEALTH BEHAVIORS. (SMOKING, NUTRITION, AND ALCOHOL): SPECIFIC AIM 4

Respondents were asked to rank (1=most important; 10= least important) their counseling behaviors in order of importance for specific health risk behaviors. Table 10 summarizes the means and standard deviations for the rank of importance for the health risk behaviors that were assessed. Data show that physical activity counseling was ranked 3rd in importance by the nurses, with smoking cessation and medical compliance ranked 1st and 2nd, respectively. Physical activity was ranked as the highest priority for health risk counseling by 7.1% (n=7) of respondents.

Table 10. Rank (mean and standard deviation) of Prioritizing for Counseling on Health Behaviors. (Specific Aim 4).

(1=most important; 10= least important) (N=98)

Variable	Mean (standard deviation)
Smoking Cessation	3.14 (±2.74)
Medical Compliance	3.35 (±2.49)
Physical Activity	4.14 (±2.19)
Nutrition Education	4.16 (±2.05)
Weight Management	4.68 (±1.88)
Immunizations	6.84 (±2.68)
Moderate Alcohol Ingestion	6.90 (±2.31)
Stress Management	6.92 (±2.32)
Mental/Emotional Health	7.06 (±2.86)
Adequate Sleep	7.51 (±1.71)

Exploratory aims of this study were to also examine the potential influence of level of nursing training, years of nursing experience, years of practice in primary care, home health care, or public health, and personal physical activity behavior on reported importance of counseling of patients on physical activity compared to other health behaviors. As shown in Table 11, Kruskal-Wallis analysis indicated that none of these factors significantly influenced the priority given to physical activity counseling by nurses compared to other health behaviors.

Table 11. Influence of Level of Training, Years of Nursing Experience, Year of Nursing Practice in Primary Care, Home Health Care, or Public Health, and Personal Physical Activity Behavior on Reported Importance of Counseling Patients on Physical Activity Compared to Health Behaviors.

	Level of Nursing Training (Mean ± standard deviation) (N=97)					
Variable	**Diploma (N=16)**	**Associates Degree (N=24)**	**BSN (N=49)**	**MSN (N=6)**	**PhD (N=2)**	***p- value**
Rank of Prioritizing of Physical Activity Counseling compared to other Health Behaviors	3.19 (± 1.79)	5.04 (±2.15)	4.12 (±2.21)	3.83 (±1.72)	4.55 (±3.53)	.110
	Years of Nursing Experience (Mean and Standard Deviation) (N=97)					
	≤5 (n=12)	**6-10 (n=15)**	**11-15 (n=9)**	**16-20 (n=15)**	**>20 (n=46)**	
	5.16 (±2.55)	4.56 (±2.70)	4.44 (±2.40)	3.60 (±1.24)	3.84 (±2.07)	.360
	Years of Nursing Practice in Primary Care, Home Care, or Public Health (N=98)					
	≤5 (N=54)	**6-10 (N=14)**	**11-15 (N=10)**	**16-20 (N=11)**	**>20 (N=19)**	
	5.00 (±.00)	4.22 (±2.47)	4.00 (±1.91)	3.88 (±2.08)	4.00 (±1.93)	.994
	Nurses Personal Physical Activity Behavior (min / week) (N=87)					
	Quartile 1 ≤100 minutes per week (n=48)	**Quartile 2 101-200 minutes per week (n=19)**	**Quartile 3 201-300 minutes per week (n=13)**	**Quartile 4 ≥300 minutes per week (n=7)**		
	4.18 (±2.18)	4.63 (±2.77)	4.07 (±1.38)	3.57 (±1.81)		.866

***Kruskal Wallis comparison **Not All respondents answered every question**

4.6 BARRIERS THAT INTERFERE WITH RN'S COUNSELING ABOUT PHYSICAL ACTIVITY: SPECIFIC AIM 5

Respondents were also asked to identify barriers to physical activity counseling within their practice. Table 11 summarizes the reported barriers with the most common barrier reported as patients are not receptive to physical activity counseling (n=55, 47%), followed by lack of time as the second most common barrier (n=40, 34%). The least commonly reported barrier was in regard to the priority of physical activity counseling and only 3.4% (n=4) indicated that physical activity counseling should not be a priority for nurses.

Table 12. : Frequency and Percentage of Identified Barriers to Physical Activity Counseling. (Specific Aim 5). (N=74)

Barrier	Frequency and Percentage	
	N	%
Patient not receptive to physical activity counseling	55	47%
Lack of time on my part as a nurse for physical activity counseling	40	34%
Knowledge Deficit of Physical Activity Guidelines	13	11%
Knowledge Deficit of How to Counsel Patients on Physical Activity	11	9.4%
I Do Not Feel it should be a Priority for Nurses to Counsel on Physical Activity	4	3.4%
Lack of Reimbursement for Nurses to Counsel on Physical Activity	7	6.0%

Exploratory aims of this study were to also examine the potential influence of level of nursing training, years of nursing experience, years of practice in primary care, home health care, or public health, and personal physical activity behavior on reported barriers to counseling of

patients on physical activity compared to other health behaviors. As shown in Table 12, none of these factors significantly influenced the percentage of nurses who reported each of the barriers to physical activity counseling that were examined in this study.

Table 13. Factors Influencing Reported Barriers to RN's Counseling about Physical Activity. (N=74)

		Barriers											
Influencing Factors	**Variable**	**Lack of Time**		**Knowledge deficit related to physical activity guidelines**		**Patient not receptive**		**Knowledge deficit on how to counsel about physical activity**		**Physical activity counseling should not be a priority for nurses**		**Lack of reimbursement**	
		N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Level of Training (N=117)	Diploma	9	7%	3	2%	7	6%	2	2%	1	.8%	0	0%
	Associates Degree	10	8%	3	2%	15	13%	3	2%	1	.8%	3	2%
	BSN	17	14%	5	4%	26	22%	6	5%	1	.8%	3	2%
	MSN	4	3%	2	2%	5	4%	0	0%	1	.8%	0	0%
	PhD	0	0%	0	0%	2	2%	0	0%	0	0%	1	.8%
***p-value**		.235		.688		.493		.815		.683		.143	
Years of Experience (N=117)	≤5	1	.8%	11	9%	1	.8%	0	0%	0	0%	5	4%
	6-10	2	2%	9	7%	2	2%	1	.8%	2	2%	8	6.8%
	11-15	1	.8%	3	2%	1	.8%	0	0%	2	2%	4	3%
	16-20	2	2%	4	3%	2	2%	0	0%	1	.8%	4	3%
	>20	7	6%	28	24%	5	4%	3	2%	2	2%	19	16.2%
***p-value**		.195		.541		.058		.910		.666		.405	
Years of practice in primary care, home care, or public health (N=117)	≤5	18	15%	7	6%	33	28%	7	6%	3	2%	2	2%
	6-10	6	5%	3	2%	8	15%	1	.8%	0	0%	2	2%
	11-15	1	.8%	0	0%	2	2%	0	0%	0	0%	0	0%
	16-20	4	3%	1	.8%	4	3%	1	.8%	0	0%	2	2%
	>20	10	8%	2	2%	8	7%	2	2%	1	.8%	1	.8%
***p-value**		.610		.804		.055		.391		.264		.218	
Personal physical activity behavior (N=117)**	Quartile 1	25	21%	9	7%	27	23%	8	15%	2	2%	3	2%
	Quartile 2	7	6%	2	2%	12	10%	2	2%	2	2%	3	2%
	Quartile 3	5	4%	2	2%	10	2%	1	.8%	0	0%	0	0%
	Quartile 4	3	2%	0	0%	3		0	0%	0	0%	1	.8%
***p-value**		.791		.667		.074		.667		.403		.248	

***Kruskal Wallis comparison **Quartile 1: <100 min/wk, Quartile 2: 101-200 min/wk, Quartile 3: 200-299 min/wk, Quartile 4: ≥300 min/wk**

4.7 REPORTED SELF-EFFICACY OF RN'S FOR PHYSICAL ACTIVITY COUNSELING: SPECIFIC AIM 6

Table 14 summarizes data which assessed the respondents' level of self-efficacy related to counseling patients about physical activity. At least two thirds (n=65, 68%) of respondents reported they agree or strongly agree they are confident in counseling patients about physical activity.

Table 14. Frequency and Percentage of Reported Levels of Self-efficacy of RN's Related to Physical Activity Counseling. (Specific Aim 6).

Variable	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Mean ± Standard Deviation
	N	%	N	%	N	%	N	%	N	%	
Self-reported confidence related to counseling patients about physical activity. (N=96)	1	1.0%	0	0%	30	31.3%	47	49%	18	18.7%	3.84 (±0.75)

Exploratory aims of this study were to also examine the potential influence of level of nursing training, years of nursing experience, years of practice in primary care, home health care, or public health, and personal physical activity behavior on self-efficacy to counsel patients on physical activity. Nurses were queried on a 5-category response scale (strongly disagree, disagree, neutral, agree, strongly agree) regarding confidence with counseling patients about physical activity. The values shown in Table 15 represent those that answered agree or strongly agree. As represented in Table 15, none of these factors significantly influenced the levels of self-efficacy for physical activity counseling that were examined in this study.

Table 15. Factors Influencing RN's Self-Efficacy Related to Physical Activity Counseling

Influencing Factors	Variable	Reported Self-efficacy		*p-value
		N	%	
Level of Training (N=98)	Diploma	15	15.3%	.761
	Associates Degree	25	25.5%	
	BSN	48	48.9%	
	MSN	8	8.1%	
	PhD	2	2.0%	
Years of Nursing Experience (N=98)	≤5	12	12.2%	.897
	6-10	14	14.2%	
	11-15	10	10.2%	
	16-20	16	16.3%	
	>20	46	46.9%	
Years of practice in primary care, home care, or public health (N=97)	≤5	48	49.4%	.491
	6-10	14	14.4%	
	11-15	8	8.2%	
	16-20	9	9.2%	
	>20	18	18.5%	
Nurses Personal Physical Activity Behavior (min / wk) (N=91)	Quartile 1 ≤100 minutes per week	51	56%	.188
	Quartile 2 100-200 minutes per week	20	21.9%	
	Quartile 3 201-300 minutes per week	13	14.2%	
	Quartile 4 ≥300 minutes per week	7	7.6%	

5.0 DISCUSSION

5.1 INTRODUCTION

Health risks associated with physical inactivity are on the rise and increasingly contribute to morbidity and mortality in the United States.1-5 Improving levels of PA among adult Americans is necessary to reduce risks and achieve potential health benefits.[8] Healthcare providers have the potential to improve health promotion practices by counseling clients to understand and strive for improved physical activity levels.

This study explored the self-reported data of nurses who currently work in primary care, home care, or public health regarding current physical activity counseling behaviors. In summary, this study showed the following findings.

1. The most frequently reported counseling behavior of nurses on health risks was to "discuss intention to adopt a new health behavior with patients" and the least frequently reported counseling behavior on health risks was to "discuss goal revision." The most frequently reported physical activity counseling behaviors were "discuss health benefits of physical activity" and to "advise patients to walk more."

2. On average, nurses reported counseling approximately 37% of their patients about physical activity and spent an average of 6.36 minutes on physical activity counseling for those patients.

3. Nearly 60% of nurses correctly reported advising patients to participate in ≥150 minutes of physical activity per week.

4. Nurses ranked physical activity counseling as the 3rd highest priority topic for health counseling among 10 topic areas with smoking cessation and medical compliance ranked as higher priorities than physical activity counseling.

5. The most frequently reported barrier to physical activity counseling was "patients not receptive" followed by "lack of time on my part as a nurse".

6. Nurse training and education, years of nursing experience, and personal physical activity behavior did not appear to influence these findings.

These findings may have implications for improving the role of nurses with regard to counseling on physical activity, which may include improved nursing education to advance the role of nurses related to physical activity counseling.

5.2 RESPONSE RATE AND GENERALIZABILITY OF FINDINGS

Multiple recruitment strategies were used to recruit registered nurses in Allegheny County, Pennsylvania. Nurses were recruited via postal mail using a listserv obtained through the Pennsylvania State Board of Nursing, electronic mail via the University of Pittsburgh Medical Center (UPMC) human resources department, and via electronic mail through the Pennsylvania State Nurses' Association (SBON) over a period of 3 months. All recruitment methods asked the respondents to type in a URL address to access the questionnaire survey on the Survey Monkey website. Reminders were sent to each participant 2 times on a predetermined schedule based on a modified Dillman method.[84] A total of 2,494 nurses were contacted through the SBON and

UPMC recruitment strategies, and this resulted in 117 nurses who were eligible and participated in this study.

The ability of this study to recruit 117 of the projected 200 nurses may have implications on the interpretation of the findings. For example, it is possible that the limited sample of nurses who participated in this study may have compromised the statistical power when exploring differences in key outcomes among different subgroups of nurses, thereby increasing the risk of Type II errors. Thus, the results of this study need to be interpreted with caution and require replication. Moreover, the low response rate of 13.8% along with the selected groups of nurses who were targeted in the recruitment efforts may reduce the generalizability of these findings to a broader group of nurses in primary care, home health, or public. Moreover, this study did not systematically recruit nurses with the intention of having adequate representation to systematically examine the exploratory aims, which again may limit the conclusions and generalizability of the findings presented.

As noted in previous literature, difficulty recruiting healthcare providers has been documented. In a recent systematic review, van Geest and Johnson reported that nurse response rates to questionnaire surveys were reportedly as low as 60%.[106] Additional data on healthcare provider questionnaire response rates was reported by Glidwell and Fincham who stated that email response rates to questionnaire surveys have declined and response rates by healthcare providers are typically lower than other respondents.[94, 105] It was suggested that using multiple approaches for recruitment, such as combining printed surveys, phone surveys, and electronic surveys may increase response rates from a low of 25% to 70%.[94, 105] While using multiple approaches is ideal, using multiple approaches for this study were not feasible due to cost and

time constraints. Future studies could implement multiple recruitment strategies to enhance recruitment of registered nurses.

Important evidence regarding barriers to recruitment was reported by Broyles et al. such as organizational and regulatory policies.[93] Barriers to participation include time constraints, lack of incentives, clinical practice setting, personal contact information, lack of perceived value of the survey, and perceptions of bias.[93, 106] In this study, regulatory policies and personal contact information proved to be barriers related to state board fees and policies regarding release of personal information on registered nurses; clinical setting was a barrier, as most respondents who were contacted were employed in a setting that did not meet eligibility criteria. In a study investigating healthcare provider participation in research, Glidwell et al. conducted two randomized controlled trials (RCT's) evaluating incentives, types of reminders, reduced response burden (full length questionnaire compared to an abridged questionnaire), and cost of interventions. One of the RCT's investigated dentists and one investigated general practitioners (GP's). The researchers determined the most effective strategy for recruitment of GP's was reduced burden (abridged questionnaire) (14.8% compared to 7.2%, risk difference (RD) -7.7 (95% CI -12.8, -2.6). Dentists who received incentives at the onset of the study (51% incentive compared to 42.2% questionnaire only, RD -8.8 (95% CI -22.5 to 4.8) had a higher response rate. The most effective strategy for dentists was sending a post card reminder.[94]

An additional strategy that can be effective for increasing response rates is to offer incentives for participation. It has been reported that offering an incentive to participants at the initial recruitment effort increased response rates by 9%.[94] The current study did not offer an incentive to nurses for participation, which may have hindered recruitment efforts. However,

future studies may consider offering an incentive to nurses for recruitment and participation in studies such as those conducted in this investigation.

5.3 NON-HOSPITAL BASED NURSES' COUNSELING BEHAVIORS RELATED TO HEALTH RISK BEHAVIORS

Nurses were queried on their counseling behaviors related to health risk behaviors and the activities they perform in regard to health counseling. In the current study, it was found nurses appear to actively engage in health counseling based on self-reported data (see Table 5). For example, 80.9% reported discussing intent to adopt a new behavior, 75.4% advise patients to set goals, and 65% evaluate progress toward meeting goals. However, these data are based on self-report, and the validity and reliability of the questionnaire that was used has not been reported. Thus, results of these self-reported data should be interpreted with caution.

Despite the self-reported nature of counseling, the high prevalence of health counseling of nurses in this study appears to be consistent the previously reported findings. A qualitative study presented by Ampt et al. reported general practitioners counsel on lifestyle risk factors according to perceived role congruence, patient risk level, clinical setting, and time allotment.[8] The study by Lambe et al. showed that 87% of practice nurses reportedly engage patients in goal setting and more than two thirds (64%) of respondents spend an average of 11-15 minutes on each lifestyle counseling consultation.[107] Data regarding time spent on health risk behavior counseling is needed to evaluate the percentage of time spent on health counseling in comparison with the amount of time spent on physical activity counseling.

5.4 NON-HOSPITAL BASED NURSES' COUNSELING BEHAVIORS RELATED TO PHYSICAL ACTIVITY BEHAVIORS

Respondents were queried about amount of time spent on physical activity counseling (see Table 6). Nurses reported that they counseled approximately 40% of patients on physical activity and approximately 6.36 (±8.9) (mode=5 minutes) minutes per patient were committed to physical activity counseling. More than half (54%) of respondents stated they are encouraged to counsel patients about physical activity within their current work. These findings are in contrast to a 2006 Scottish study by Douglas et al. who used a questionnaire survey of various healthcare providers to explore attitudes and knowledge regarding physical activity counseling in primary care during routine visits. Of 212 nurses surveyed, 90% reported they recommend moderate levels of physical activity to all of their patients.[10] Thus, it is important to understand factors within the current study and prior studies that may explain the difference in the frequency that nurses engage in physical activity counseling. However, the limited literature in this area of study may suggest that additional investigations are warranted to thoroughly examine this important research question.

Of interest, this study showed that nurses prioritized physical activity counseling as 3rd out of 10 health behaviors (see Table 10). Only smoking cessation and medical compliance were prioritized higher than physical activity counseling. Healthcare professionals consistently regard smoking as a more significant health concern than other health risk behaviors, although counseling about physical activity could have a similar impact on disease risk reduction.[2, 8] However, it is recognized that nurses need to prioritize health counseling of lifestyle behaviors within the context of patient needs and health status, which may influence the priority that is given to physical activity counseling. For example, in a study conducted on critical care

inpatient nurses by Zewe, physical activity was ranked in order of priority as 5th out of 10 health risk behaviors,[81] which may be appropriate given the potential need for nurse to focus primarily on the acute care of these patients. Thus, the difference noted between inpatient and non-hospital nurses could be related to inpatient nurses giving higher priority to acute patient conditions and non-hospital nurses being expected to offer more health promotion teaching. The high importance place on physical activity counseling found in the current study is consistent with the findings of Esposito and Fitzpatrick, who reported that nurses recommend exercise as health promotion counseling and as part of a treatment plan for the patient's condition.[26] It is possible smoking cessation as a health risk behavior among healthcare workers has historically been given greater importance in comparison with physical activity and that the emphasis of physical activity on health risks is warranted to increase physical activity counseling.

5.5 NON-HOSPITAL BASED NURSES' KNOWLEDGE OF THE AMOUNT OF PHYSICAL ACTIVITY THAT IS RECOMMENDED FOR HEALTH

Non-hospital based nurses were asked to report on their current knowledge of the amount of physical activity that's recommended for health. Nurses' knowledge of current physical activity recommendations was defined as the reported number of minutes per week they currently recommend to patients (see Table 8). According to the Physical Activity Guidelines for Americans, the current recommendation is ≥ 150 minutes of physical activity per week. The survey queried nurses on the number of days per week and the number of minutes per day of physical activity that are recommended by the Physical Activity Guidelines for Americans.[17] When days and minutes were used to compute the recommended minutes per week of physical

activity, 60.2% (n= 58) recommended ≥150 minutes per week, which is more than what other studies of nurses have reported. However, this finding should be interpreted with caution because approximately 11% of nurses reported recommending 210 – 269 minutes per week of physical activity, with 7% of nurses recommending >270 minutes per week of physical activity. Thus, while technically recommending a dose of physical activity that is consistent with the Physical Activity Guidelines for Americans (>150 minutes per week), it appears that some nurses are recommending physical activity at the high end of the recommendations, which may not be appropriate for all patient populations.

Douglas et al. reported 7% of practice nurses (n=212) correctly identified the current physical activity recommendations (30 minutes/day on 5 days/week).[10] Some nurses are providing physical activity counseling according to the guidelines, but improvement is necessary to reach intended public health initiatives.[10, 14] As reported in the Physical Activity Guidelines for Americans, health benefits are realized with at least 150 minutes of physical activity per week, but higher levels of activity may contribute to greater health benefits.[17] Physical activity recommendations advise moderate to vigorous activity, yet only 12.2% (n=13) of respondents are likely or very likely to actually recommend vigorous physical activity. The majority are likely or strongly likely to advise patients to walk more (n=59, 55.2%). The contrast in findings between the current study and previous findings presented by Douglas et al. may be a result of differences in factors used to determine the nurses' knowledge level or in the difference in definition of physical activity guidelines.[10] For example, Douglas et al. define a correct response to the physical activity recommendations as reporting 30 minutes/day on 5 days/week, whereas the current study define this as ≥150 minutes per week. However, even with this difference in how the appropriate level of physical activity was define, the current study reported that

approximately 60% of the nurses surveyed provided a response that was consistent with current physical activity guidelines. Thus, it is likely that a gap exists in nurses' knowledge of the physical activity recommendations and increasing nurse education on physical activity recommendations could be beneficial.

5.6 BARRIERS THAT INTERFERE WITH NURSES COUNSELING ABOUT PHYSICAL ACTIVITY IN THE NON-HOSPITAL SETTING

Nurses were queried about barriers that interfere with physical activity counseling in the non-hospital setting. Respondents were asked to select from a list of commonly reported barriers and they were able to select the barriers that they believed applied to them. "Patient not receptive to physical activity" was the most frequently reported barrier (47%), followed by "lack of time on my part for physical activity counseling" (34%) (see Table 12). By comparison, Douglas et al. reported that 21% (n=212) of practice nurses report a lack of time as a barrier to physical activity counseling; however, but Lambe et al. reported that 73.8% (n=31) of practice nurse report insufficient time as a barrier.[10, 107] Douglas et al. also found that "patient not motivated" was true for 14% (n=212) of respondents, lack of educational materials for healthcare providers was identified as the most commonly reported barrier by 46% of practice nurses, and insufficient patient educational materials by 39% of respondents.[10] Although not examined as barriers to physical activity counseling in the current study, these additional barriers should be evaluated in future studies when examining factors that nurses perceive to influence their ability to engage in physical activity counseling.

5.7 NURSES' SELF-EFFICACY REGARDING PHYSICAL ACTIVITY

Levels of self-efficacy were assessed regarding physical activity counseling. Nurses were queried as to their confidence in counseling adult patients to be physically active using a 5-category response scale (strongly disagree, disagree, neutral, agree, strongly agree) (see Table 14). Slightly more than two thirds (68%) agreed or strongly agreed they are confident about counseling related to physical activity and 60.2% have knowledge of current physical activity recommendations (defined as at least 150 minutes per week), but only 54% are encouraged to counsel about physical activity in their current practice setting. Respondents are counseling less than half (37.5%) of patients on physical activity and spend as little as 6 minutes per patient. Burke and Fair suggest that self-efficacy in patient counseling could be related to lack of confidence in how to counsel, knowledge of what to teach, and behavioral theory.[114] Results of the current study are similar to previously reported results by Douglas et al. who reported that about 71% of practice nurses have sufficient knowledge regarding physical activity advice, while Steptoe et al. reported 48.2% of nurses felt properly trained to provide physical activity counseling and 14.5% felt it was not difficult to counsel patients on physical activity.[10, 112] In a study examining factors influential to counseling for smoking cessation, "recent training" was suggested as a contributing factor to self-efficacy for smoking cessation counseling by Wetta-Hall.[108] There is a possibility that the inconsistencies in data with previous studies by Douglas et al. and Steptoe et al. were a result of differences methods used to assess self-efficacy.[10, 112] Another possibility is that differences in training of nurses to implement physical activity initiatives in different geographic locations (Scotland, Ireland, and the United States) is influential in the self-efficacy of nurses to provide physical activity counseling. Further

exploration of these factors could be beneficial to determine the level of self-efficacy nurses have for physical activity counseling.

5.8 EXPLORATORY FINDINGS

The current study also explored whether nurses' training, years of nursing experience, and personal physical activity behaviors influence factors related to physical activity counseling. These were exploratory aims of this study, and were therefore not adequately powered for extensive and definitive analyses. Thus, a brief discussion of these findings and implications is provided below.

TRAINING AND EDUCATION

This study showed that nurses' training and nursing education did not influence the results related to health risk counseling, physical activity counseling, nurses' knowledge of physical activity recommendations, rank of importance of physical activity compared to other health risks, barriers to physical activity counseling, and self-efficacy nurses have for physical activity counseling. These findings are in contrast to other studies in which health counseling of nurses was reported. For example, Wetta-Hall et al. reported that nurses who were BSN prepared or higher more consistently provided smoking cessation advice compared to non-BSN-prepared nurses.[108] However, there were no differences between non-BSN and BSN prepared nurses related to assessment of patients' tobacco use. Additionally, nurses with training on smoking cessation within the previous year were more likely to provide smoking cessation counseling. BSN, MSN, and DNP programs are required by the Commission of Collegiate

Nursing Education (CCNE) Essentials and the American Association of the Colleges of Nurses (AACN) to include risk prevention components within the curricula.[111, 113] It is possible that the difference in findings between this current study and prior studies is related to the health behavior of interest, with the current study focused on physical activity and prior studies focused on smoking cessation. It is also possible that curricular requirements influenced the nurses who had higher levels of training. Nurses working in settings which encourage health risk counseling may receive more training which could be influential in nurse counseling behaviors. Future studies investigating levels of training on health risk counseling, specifically assessment and advice giving for physical activity, are warranted.

NURSING EXPERIENCE

This study showed that nursing experience did not influence the results related to health risk counseling, physical activity counseling, nurses' knowledge of physical activity recommendations, rank of importance of physical activity compared to other health risks, barriers to physical activity counseling, and self-efficacy nurses have for physical activity counseling. This is somewhat in contrast to other reports in the literature. For example, in a study focusing on the health behavior "smoking cessation" counseling, Wetta-Hall et al. evaluated smoking cessation counseling behaviors of nurses.108 It was determined that nurses with fewer years of experience were less likely to assess tobacco use than nurses with other years of experience (≤5 years of experience (odds ratio (OR) 0.41, CI 0.18-0.93) p=0.04)). However, years of experience did not significantly influence smoking cessation advice given (OR 0.47, CI 0.21-1.03, p=NS).[108] The differences in findings between years of experience in the current study and the Wetta-Hall study could possibly be explained by the self-efficacy of more experienced nurses to provide patient counseling.[108] Nurses with more years of experience may

have received workplace training for smoking cessation as a priority health behavior of interest, whereas, less experienced nurses may need additional workplace training to counsel on health risk behaviors. Further investigation of nursing experience on training to adopt health counseling behaviors is needed to explore these factors.

PERSONAL PHYSICAL ACTIVITY BEHAVIOR

This study showed that personal physical activity behavior did not influence the results related to health risk counseling, physical activity counseling, nurses' knowledge of physical activity recommendations, rank of importance of physical activity compared to other health risks, barriers to physical activity counseling, and self-efficacy nurses have for physical activity counseling. These finding are in contrast to McDowell et al. who conducted a questionnaire survey of 220 practice nurses regarding physical activity counseling and determined there was a statistically significant difference in physical activity counseling (giving advice or giving a pamphlet) among nurses who were regularly active (60.2%) compared to those who were not regular exercisers (39.8%) ($p<0.05$).[75] Moreover, a cross-sectional survey of physicians conducted by Abramson et al. showed that physicians who exercise more are more likely to provide physical activity counseling on the benefits of physical activity.[99] The inconsistencies regarding the influence of personal behavior in this study in comparison with previous studies could be the result of limitations in sample size with the majority of nurses (n=48, 55%) participating in ≤100 minutes of physical activity per week.

5.9 LIMITATIONS AND FUTURE DIRECTIONS

The following limitations and recommendations should be considered to advance research in this topic area:

1. Several barriers interfered with recruitment efforts.

a. Nurses in non-inpatient settings were recruited for investigation. Institutional regulations and state policies created barriers to nurse recruitment. Obtaining access to non-hospital based nurses was challenging. Recruiting through the Pennsylvania State Board of Nursing permitted costly access to all registered nurses in the state, however, it was impossible to query only nurses in the selected specialty areas. Therefore, the listserv that was obtained included nurses from all areas of nursing, with only a small portion of them from the selected non-hospital based area being recruited. Physical addresses for each nurse on the listserv were purchased and letters were mailed 3 times. This was costly, time consuming, and exhausted funding and provided a very small sample.

b. A secondary recruitment effort, recruitment via a human resources department and sending recruitment letters electronically to a query of nurses currently working in the selected specialty area proved to be more productive. Electronic access is less costly and provides a quicker response rate. A recommendation for future research would be to recruit nurses electronically through institutional affiliation at various healthcare systems.93

c. Incentives were not offered because funds were limited. Incentives increase recruitment efforts. Future researchers should consider incentivizing participants at initial recruitment contact to increase participation rates.93

2. This study examined only nurses in primary care, home care, and public health. Future studies should include nurses who work in other non-hospital based settings, specialty areas such as cardiology, oncology, endocrinology, and other areas where health promotion is addressed.

3. Nurses from one county in the state of Pennsylvania were included. Allegheny County has the largest proportion of nurses in the state, thus, was considered at the onset of the study to likely provide a most representative sample. However, Allegheny County also has the largest numbers of hospitals in a metropolitan area in the state. It is possible that most of the nurses registered who live in Allegheny County are employed in an inpatient setting, and were not eligible to participate in the study. A recommendation for future research would be to recruit nurses from a larger geographic area.

4. Data collected in the survey were based on self-report. Validation of the findings could be a focus of future research, with consideration given to objective assessment of measures.

5. Data were collected at a single time point via questionnaire survey, which limits findings that could occur in nurse counseling over time. In the future, additional research could evaluate nurses prospectively with intervention research to evaluate changes in nurse behavior, as well as changes in patient behavior.

6. Data were collected primarily as categorical data, and based on the recruitment in this study, resulted in some responses being confirmed by relatively small numbers of nurse participants. This may limit the feasibility of the statistical approaches used in this study. Thus, future studies may consider aggregating the data into different conceptually

important categories prior to statistical analysis, which may enhance the interpretation of the findings.

7. Changes in healthcare are occurring and nurses are being charged with providing health promotion in all settings. Additional education of nurses will be required to meet the standards being set for public health initiatives. Future research could evaluate whether nurses trained in physical activity counseling are more likely to counsel on physical activity in comparison with nurses who do not have training in physical activity counseling.

5.10 CONCLUSION

Physical inactivity contributes to preventable chronic conditions such as cardiovascular disease (CVD), diabetes, overweight and obesity, arthritis, some types of cancer, anxiety and depression, among other health-related conditions.[1-5] Improving levels of physical activity in the population is considered to be an effective method to address these preventable health conditions.[8] Public health initiatives charge healthcare providers with addressing physical activity in all healthcare settings and addressing physical activity is being considered as the 5th vital sign. [9,22,23] Nurses are trained health counselors, addressing many health concerns, and are in a key role to tailor physical activity counseling to meet patient needs.[30, 32-34] Patients prefer to receive health counseling from nurses in comparison with physicians.[104] There are limited studies investigating nurses in the non-hospital setting in regard to physical activity counseling, however, studies investigating physicians and nurse practitioners related to physical activity counseling show modest but positive patient outcomes. [20, 24-31]

This study was conducted to examine the counseling behaviors of RN's related to health risk behaviors, to examine the counseling behaviors of RN's related to physical activity behaviors, to describe the RN's knowledge of the amount of physical activity that is recommended for health to examine the degree which RN's prioritize counseling patients on physical activity compared to health behaviors (smoking, nutrition, and alcohol), to examine the barriers that exist that interfere with RN's counseling about PA, and to examine the self-efficacy that RN's report related to physical activity. In this study, nearly 70% of nurses were confident about counseling patients regarding physical activity recommendations. And, based on self-reported data, findings showed that 60% of respondents have sufficient knowledge regarding the Physical Activity Guidelines for Americans, yet spend about 6 minutes per patient counseling on physical activity. Existing research states that 1 in 3 patients receives physical activity counseling in the non-hospital based setting. [9-12]

Although inpatient nurses rank physical activity counseling 5th out of 10 healthcare related behaviors, 81 the mean rank of physical activity counseling in this study was 3rd out of 10. This could be the result of non-inpatient nurses having a greater focus on health promotion and working toward meeting public health initiatives.[102] The most common barriers reported to physical activity counseling were: 1) patients are not receptive to physical activity counseling, and 2) followed by lack of time as the second most common barrier. Although there was not an identified gap in knowledge of current physical activity recommendations, non-inpatient nurses are counseling patients on physical activity only 37% of the time. Since physical activity has been determined to have a relevant impact on health outcomes and recent public health and governmental initiatives have incorporated physical activity counseling as an area of priority, an

emphasis on nurse training is needed to address the role nurses can have on physical activity counseling.

APPENDIX A

INITIAL INVITATION LETTER

University of Pittsburgh

School of Education
Physical Activity and Weight Management Research Center

Suite 600 Birmingham Towers
2100 Wharton Street
Pittsburgh, PA 15203
412-488-4184
Fax: 412-488-4174

Dear Fellow Nurse:

You are invited to participate in an exciting research study because of your position in a clinical setting that is not inpatient. I am a nurse who is currently a doctoral student in the Department of Health and Physical Activity at the University of Pittsburgh and a School of Nursing faculty member at Carlow University in Pittsburgh. This study is related to fulfillment of the dissertation requirement to complete my Doctorate of Philosophy (PhD) training. The purpose of this research study is to examine the factors which influence how registered nurses (RN's) prioritize health counseling in the non-inpatient setting. For that reason, RN's from various non-inpatient settings are being asked to complete a brief (approximately 5-7 minutes) online survey.

If you are willing to participate, the online survey will ask about your nursing background (e.g., your role in the practice, number of years you have been a RN, and how long you have been employed in your current position) and about your usual practice of health counseling. There are no foreseeable risks associated with this project, nor are there any direct benefits to you. All responses are confidential, and

any linkage to you will be removed once you complete the survey and prior to the data you provide being analyzed.

If you would like to participate in this study, use the following link to access the online survey.

> http://www.(the web link was inserted here)
>
> *In response to Question 1 on the survey please enter the following code: (a unique code for each participant was provided here)*

Your participation is voluntary, and you may decide not to complete the survey.

This study is being conducted by Renee M. Ingel, who can be reached at 412-445-3182 if you have any questions about this study.

Thank you in advance for your time and cooperation.

Sincerely,
Renee M. Ingel MSN, RN

APPENDIX B

POST CARD MAILED AT WEEKS 2, 3, AND 5

If you would like to participate in this study, use the following link to access the online survey and additional details about your participation in this study.

http://www.(the web link was inserted here)

In response to Question 1 on the survey please enter the following code: (a unique code for each participant was provided here)

APPENDIX C

INTRODUCTION LETTER

Dear Registered Nurse,

The purpose of this research study is to evaluate the registered nurses' ability to counsel patients about physical activity. I am surveying Registered Nurses who currently work in a non- inpatient clinical setting in the state of Pennsylvania.

The survey is brief and should take about 5-7 minutes to complete. If you are willing to participate, our questionnaire will ask about background (e.g., age, race, years of nursing experience, level of nursing education, current practice setting, personal physical activity level), as well as about your personal counseling behaviors, particularly counseling about physical activity. The data collected from this research study survey will not be reported individually; it will only be reported in aggregate. All responses will be kept strictly confidential, and results will be kept in a secured location. The survey will request that you insert a numerical study code that was provided on the letter or postcard you received to assist the Principal Investigator in monitoring survey completion and to control for duplicate survey completion. All numerical links will be destroyed once the surveys are all collected and prior to the data being analyzed.

Once you complete the survey, please submit the survey by clicking the "SUBMIT" button to have your survey responses recorded.

Your participation is voluntary and you can withdraw from the study at any time. There is minimal risk of harm, aside from evaluation of personal behavior. The only benefit of participation is that your participation will contribute to the understanding of counseling behaviors of nurses on physical activity.

This research study is being conducted by Renee Ingel, MSN, RN, PhD(c), doctoral student, who can be reached at rmi4@pitt.edu or at 412-445-3182. If you have questions about this research study, you may contact this investigator. If you have questions about your rights as a research subject, please contact the Human Subjects Protection Advocate at the University of Pittsburgh IRB Office, 1-866-212-2668.

APPENDIX D

QUESTIONNAIRE SURVEY

1. Please insert the 4 digit code that was provided on the letter or postcard that you received.

   — — — —

2. Does your current primary nursing role involve patient contact?
   A. Yes
   B. No-if NO, not eligible

3. Current practice setting
   A. Hospital-if yes NOT ELIGIBLE Nursing home-if yes NOT ELIGIBLE AND SURVEY STOPPED
   B. Personal care home-if yes NOT ELIGIBLE AND SURVEY STOPPED
   C. Rehabilitation setting-if yes NOT ELIGIBLE AND SURVEY STOPPED
   D. Education-if yes, NOT ELIGIBLE AND SURVEY STOPPED
   E. Primary care
   F. Home care
   G. Public health

4. Age
   A. < 25 years
   B. 25-30 years
   C. 31-40 years
   D. 41-50 years
   E. 51-60 years
   F. > 60 years

5. Gender
   A. Male
   B. Female

6. Your highest degree of nursing education:
   A. Diploma
   B. Associates Degree
   C. BSN
   D. MSN
   E. PhD
   F. DNP

7. Your initial RN training
   A. Diploma School
   B. Associates Degree
   C. BSN

8. Years of nursing experience:
   A. < 1
   B. 1-5
   C. 6-10
   D. 11-15
   E. 16-20
   F. 21-25
   G. 26-30
   H. 31-35
   I. >35

9. Years of nursing in primary care, home care, or public health:
   A. < 1
   B. 1-5
   C. 6-10
   D. 11-15
   E. 16-20
   F. 21-25
   G. 26-30
   H. 31-35
   I. > 35

10. Which are you presently:
   A. Full time
   B. Part time
   C. Casual

11. Ethnicity: Do you consider yourself to be Hispanic or Latino, that is, of Mexican, Puerto Rican, Cuban, or Latin American descent?
   A. Yes
   B. No
   C. Unknown

12. Race: Please choose one category that applies to you:
    A. White
    B. Black or African American
    C. American Indian
    D. Alaska Native
    E. Native Hawaiian or other Pacific Islander
    F. Asian
    G. Other
    H. Unknown

13. Within the health-care setting in which you are employed, are you encouraged to counsel adult patients on health risk behaviors?
    A. Yes
    B. No

14. During consultations with adult patients, which of the following activities are you likely to perform in relation to health counseling?

	Very Unlikely	Unlikely	Somewhat likely	Likely	Very Likely
a. Discuss intention to adopt a new health behavior?					
b. Advise patients to set goals for health?					
c. Evaluate patient's progress in meeting goals?					
d. Advise patients to track the achievement of goals?					
e. Discuss whether goals need to be revised?					

15. Within the health-care setting in which you are employed, are you encouraged to counsel adult patients on physical activity?
    A. Yes
    B. No

16. During consultations with adult patients, which of the following counseling behaviors are you likely to perform in relation to physical activity?

	Very Unlikely	Unlikely	Somewhat likely	Likely	Very Likely
a. Discuss health benefits of physical activity					
b. Discuss psychological benefits of physical activity					
c. Advise patients to be more physically active by doing housework, heavy gardening, etc.					
d. Advise patients to walk more as part of daily activities.					
e. Advise patients to participate in moderate physical activity (physical activity that causes you to be warm, slightly out of breath and makes your heart beat faster than normal.)					
f. Advise patients to participate in vigorous physical activity (physical activity that causes you to sweat, breathe harder, and makes your heart beat fast)?					

17. Please rank the following lifestyle health-related behaviors in order of priority when you are counseling/educating an adult patient during a "routine wellness visit." ("1" is the most important and "10" is the least important. Use each number only once.)

Rank	Health-Related Behavior
	Physical Activity
	Smoking Cessation
	Nutrition Education
	Weight Management
	Moderate Alcohol Ingestion
	Medical Compliance
	Immunizations
	Adequate Sleep
	Stress Management
	Mental/Emotional Health

18. Please indicate your level of agreement with the following statements which describe opinions on promoting physical activity.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a. Health promotion is an important part of my work.					
b. I believe that it is important to counsel patients about physical activity.					
c. I am confident counseling adult patients related to physical activity.					
d. I only advise patients about physical activity if linked to their current problem.					
e. I have sufficient knowledge of current physical activity recommendations to advise patients about physical activity.					
f. I try to encourage as many patients as possible to increase their physical activity.					
g. I only discuss physical activity if the patient mentions it.					

19. To promote and maintain health, the current Physical Activity Guidelines for Americans recommend engaging in aerobic physical activity of a moderate intensity for how many days of the week?

    A. 0 days
    B. At least 1 day per week
    C. At least 2 days per week
    D. At least 3 days per seek
    E. At least 4 days per week
    F. At least 5 days per week
    G. At least 6 days per week
    H. At least 7 days per week

20. To promote and maintain health, the current Physical Activity Guidelines for Americans recommend engaging in aerobic physical activity of a moderate intensity for how many minutes per day?

    _____minutes

21. On average, what percent of your adult patients do you counsel on physical activity?

    _____percent

22. On average, how much time per adult patient do you spend counseling on physical activity?

    _____minutes

23. Please identify barriers to physical activity counseling with adult patients. (Choose all that apply)

    A. Lack of time on my part as a nurse for physical activity counseling
    B. I have a knowledge deficit related to the physical activity guidelines
    C. Patient not receptive to education/counseling for physical activity
    D. I have a knowledge deficit of how to counsel patients about physical activity
    E. I do not feel that it should be a priority for nurses to counsel on physical activity
    F. There is lack of reimbursement for nurses to counsel on physical activity
    G. Other (please specify): _____

24. Personal activity: Have you regularly participated in a minimum of 30 minutes of moderate intensity physical activity per day on five or more days per week *over the past 6 months*?
    A. Yes
    B. No

25. Even if you do not define yourself as a "regular exerciser" based on Question 24 on average, how many days per week do you exercise?

    A. 0 days per week
    B. 1 day per week
    C. 2 days per week
    D. 3 days per week
    E. 4 days per week
    F. 5 days per week
    G. 6 days per week
    H. 7 days per week

26. Even if you do not define yourself as a "regular exerciser" based on Question 24 on days that you do exercise, on average, how many minutes per day per do you exercise?
    A. 0 minutes per day
    B. 10 minutes per day
    C. 20 minutes per day
    D. 30 minutes per day
    E. 40 minutes per day
    F. 50 minutes per day
    G. 60 minutes per day
    H. >60 minutes per day

27. If you do not engage in personal physical activity on a regular basis, please identify the barriers which prevent you from engaging in physical activity. (Choose all that apply)
    A. Lack of time for exercise
    B. Exercise is inconvenient
    C. Lack of motivation to exercise
    D. Unable to exercise due to health limitations
    E. Other (please specify): _____

BIBLIOGRAPHY

1. Pate, R.R., Pratt, M., Blair, S.N., Haskell, W.L., Macera, C.A., Bouchard, C… & Wilmore, J.H. (1995). Physical activity and public health—a recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. JAMA: The Journal of the American Medical Association, 273(5), 402-407.

2. Aspy, C.B., Mold, J.W., Thompson, D.M., Blondell, R.D., Landers, P.S., Reilly, K.E. & Wright-Eakers, L. (2008). Integrating screening and interventions for unhealthy behaviors into primary care practices. American Journal of Preventive Medicine. 35(5), S373-S380.

3. Berra, K. (2010). Challenges of changing lifestyle to reduce risk for cardiovascular disease. Journal of Cardiovascular Nursing. 25(3), 223-227.

4. United States Department of Health and Human Services (HHS), Office of Disease Prevention and Health Promotion. (2008). Physical activity guidelines advisory committee report, Washington: HHS. Retrieved from http://www.health.gov/paguidelines/Report/pdf/A_summary.pdf

5. Kruk, J. (2007). Physical activity in the prevention of the most frequent chronic diseases: An analysis of the recent evidence. Asian Pacific Journal of Cancer Prevention: APJCP, 8(3), 325-338.

6. Rapid growth expected in number of Americans who have chronic conditions. Statistics and research: prevalence. (2004). Partnership for Solutions: Better lives for people with chronic conditions.http://www.partnershipforsolutions.org/statistics/prevalence.

7. Haskell, W.L., Lee, I-M, Pate, R.R., Powell, K.E., Blair, S.N., Franklin, B.A… & Bauman, A. (2007). Physical activity and public health: Updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. Circulation. 116, 1083-1093.

8. Ampt, A.J., Amoroso, C., Harris, M.F., McKenzie, S.H., Rose, V.K. & Taggart, J.R. (2009). Attitudes, norms, and controls influencing lifestyle risk factor management in general practice. BMC Family Practice. 10(59), 1-8.

9. Pratt, P.K. & Sallis, R.E. (2009).The healthcare sector's role in the U.S. national physical activity plan. Journal of Physical Activity and Health. 6(suppl 2), S211-219.

10. Douglas, F., Torrance, N., van Teijlingen, E., Meloni, S., & Kerr, A. (2006). Primary care staff's views and experiences related to routinely advising patients about physical activity. A questionnaire survey. BMC Public Health. 6, 138.

11. Wilcox, S., Parra-Medina, D., Felton, G.M., Poston, M.E. & McClain, A. (2010). Adoption and implementation of physical activity and dietary counseling by community health center providers and nurses. Journal of Physical Activity and Health. 7(5), 602-612.

12. Barnes, P.M. & Schoenborn, C.A. (2012). Trends in adults receiving recommendations for exercise or other physical activity from a physician or other health professional. NCHS Data Brief. (86), 1-8.

13. Sallis, R.E. (2009). Exercise is medicine and physicians need to prescribe it! British Journal of Sports Medicine. 43(1), 3-4.

14. United States Department of Health and Human Services. (2010). Healthy People 2020: Physical Activity. http://www.healthypeople.gov/2020/topicsobjectives2020/overview.aspx

15. Lin, J.S., O'Connor, E., Whitlock, E.P., & Beil, T.L. (2010). Behavioral counseling to promote physical activity and a healthful diet to prevent cardiovascular disease in adults: a systematic review for the US Preventive Services Task Force. Annals of Internal Medicine, 153(11), 736-750.

16. Make the Move. (n.d.). The United States national physical activity plan. http://www.physicalactivityplan.org

17. United States Department of Health and Human Services (HHS), Office of Disease Prevention and Health Promotion. (2009). 2008 Physical activity guidelines for Americans. Retrieved from http://www.health.gov/paguidelines

18. Simkin-Silverman, L.R., Conroy, M.B., Bhargava, T., & McTigue, K.M. (2011). Development of an online diabetes prevention lifestyle intervention coaching protocol for use in primary care practice. The Diabetes Educator. 37(2), 263-268. doi: 10.1177/014572171039

19. Simkin-Silverman, L.R., Gleason, K.A., King, W.C., Weissfeld, L.A., Buhari, A., Boraz, M.A. & Wing, R.R. (2005). Predictors of weight control advice in primary care practices: patient health and psychosocial characteristics. Preventive Medicine. 40(1), 71-82.

20. Smith, A.W., Borowski, L.A., Liu, B., Galuska, D.A., Signore, C., Klabunde, C… & Ballard-Barbash, R. (2011). U.S. Primary care physicians' diet-, activity- and weight-related care of adult patients. American Journal of Preventive Medicine. 41(1): 33-42.

21. Reiser, L.M. & Schlenk, E.A. (2009). Clinical use of physical activity measures. Journal of the American Academy of Nurse Practitioners. 21(2), 87-94.

22. Sallis, R. (2011). Physical activity as a 5th vital sign. British Journal of Sports Medicine. 45(6), 473-474.

23. Blair, S.N., Sallis, R.E., Hutber, A., & Archer, H.E. (2012). Exercise therapy-the public health message. Scandanavian Journal of Medicine & Science in Sports. 22(4), 24-28.

24. Hudon, C., Fortin, M., and Soubhi, H. (2008). Single risk factor interventions to promote physical activity among patients with chronic diseases: Systematic review. Canadian Family Physician. 54, 1130-1137.

25. Tidwell, L., Holland, S.K., Greenberg, J., Malone, J., Mullan, J., & Newcomer, R. (2004). Community-based nurse health coaching and its effect on fitness participation. Lippincott's Case Management: Managing the Process of Patient Care, 9(6), 267-279.

26. Esposito, E.M & Fitzpatrick, J.J. (2011). Registered nurses' beliefs of the benefits of exercise, their exercise behavior and their patient teaching regarding exercise. International Journal of Nursing Practice. 17(4), 351-356.

27. Peterson, J.A. (2007). Get moving! Physical activity counseling in primary care. Journal of American Academy of Nurse Practitioners. 19(7), 349-357.

28. Sherman, B.J., Gilliland, G., Speckman, J.L. & Freund, K.M. (2007).The effect of a primary care exercise intervention for rural women. Preventive Medicine. 44(3), 198-201.

29. Stensel, D. (2009). Primary prevention of CVD: physical activity. Clinical Evidence. 6, 218.

30. Absetz, P., Valve, R., Oldenburg, B., Heinonen, H., Nissinen, A., Fogelholm, M… & Utella, A. (2007). Type 2 diabetes prevention in the "real world" one-year results of the GOAL implementation trial. Diabetes Care. 30(10), 2465-2470.

31. United States Department of Health and Human Services Center for Disease Control and Prevention. National Center for Chronic Disease Prevention and Health Promotion. (2009). Chronic Disease Notes & Reports. 19(1), 1-52. http://www.cdc.gov/chronicdisease/resources/publications/AAG/chronic.htm

32. Carey, N., & Courtenay, M. (2007). A review of the activity and effects of nurse-led care in diabetes. Journal of Clinical Nursing, 16(11), 296-304. doi: 10.1111/j.1365-2702.2007.01969.

33. Jiang, X., Sit, J.W., & Wong, T.K.S. (2007). A nurse-led cardiac rehabilitation programme improves health behaviours and cardiac physiological risk parameters: evidence from Chengdu, China. Journal of Clinical Nursing, 16(10), 1886-1897.

34. Drevenhorn, E., Kjellgren, K.I., Bengtson, A. (2007). Outcomes following a programme for lifestyle changes with people with hypertension. Journal of Clinical Nursing & Healthcare of Chronic Illnesses, 16(7), 144-151.

35. Hardman, A.E. & Stensel, D.J. (2009). Physical Activity and Health: The Evidence Explained. (2nd ed.) Routledge, NY: Taylor and Francis Group.

36. O'Donovan, G., Blazevich, A.J., Boreham, C., Cooper, A.R., Crank, H., Ekelund, U…& Stamatakis, E. (2010). The ABC of physical activity for health: a consensus statement from the British Association of Sport and Exercise Sciences. Journal of Sports Sciences. 28(6): 573-591.

37. Thompson, W.R., Gordon, N.F., & Pescatello, L.S. (2009). ACSM's guidelines for exercise testing and prescription, (8th ed.). Lippincott, Williams, and Wilkins.

38. Murphy, S.L., Xu, J., & Kochanek, M.A. (2012). Deaths: preliminary data for 2010. National Vital Statistics Reports.60, 4. http://www.cdc.gov/nchs/data/nvsr/nvsr60/nvsr60_04.pdf

39. Genest, J., & Libby P. (2011). Lipoprotein disorders and cardiovascular disease. In: Bonow, R.O., Mann, D.L., Zipes, D.P., & Libby, P.(Eds.), Braunwald's Heart Disease: A Textbook of Cardiovascular Medicine (chapter 47).(9th ed.). Philadelphia, Pa: Saunders Elsevier.

40. Paffenbarger, R.S., Blair, S.N., and Lee, I-M. (2001). A history of physical activity, cardiovascular health and longevity: The scientific contributions of Jeremy N Morris DSc, DPH, FRCP. International Journal of Epidemiology. 30(5), 1184-1192.

41. Paffenbarger, R.S., Hyde, R.T., Wing, A.L., Lee, I-M, Jung, D.L., & Kampert, J.B.(1993). The association of changes in physical-activity level and other healthy lifestyle characteristics with mortality among men. New England Journal of Medicine. 328(8), 538-545.

42. Morris, J.N., Crawford, M.D. (1958). Coronary heart disease and physical activity of work: evidence of a national necropsy survey. British Medical Journal, 2(5111), 1485-1496.

43. Paffenbarger, R.S. & Hale, W.E. (1975). Work activity and coronary heart mortality. New England Journal of Medicine. 292, 545-550.

44. Rhodes, R.E., Mark, R.S., & Temmel, C.P. (2012). Adult sedentary behavior: a systematic review. American Journal of Preventive Medicine, 42(3), 3-e28.

45. Williams, P.T. (1996). High density lipoprotein cholesterol, and other risk factors for coronary heart disease in female runners. New England Journal of Medicine, 334(20), 1298-1303.

46. Lee, D., Sui, X., Church, T.S., Lavie, C.J., Jackson, A.S., & Blair, S.N. (2012). Changes in fitness and fatness on the development of cardiovascular disease risk factors: hypertension, metabolic syndrome, and hypercholesterolemia. Journal of the American College of Cardiology. 59(7), 665-672.

47. Whelton, S.P., Chin, A., Xin, X., & He, J. (2002). Effect of aerobic exercise on blood pressure: a meta-analysis of randomized, controlled trials. Annals of Internal Medicine. 136(7), 493-503.

48. Bassuk, S.S. & Manson, J.E. (2005). Epidemiological evidence for the role of physical activity in reducing the risk of type 2 diabetes and cardiovascular disease. Journal of Applied Physiology. 99(3), 1193-1204.

49. Wei, M., Gibbons, L.W., Mitchell, T.L., Kampert, J.B., Lee, C.D., & Blair, S.N. (1999). The association between cardiorespiratory fitness and impaired fasting glucose and type 2 diabetes mellitus in men. Annals of Internal Medicine. 130(2): 89-96.

50. Flegal, K.M., Carroll, M.D., Ogden, C.L. & Curtin, L.R. (2010). Prevalence and trends in obesity among US adults, 1999-2008. Journal of the American Medical Association. 303(3), 235-241.

51. Drøyvold, W.B, Holmen, J. & Midthjell, K. (2004). BMI change and leisure time physical activity (LTPA): an 11 year follow-up study in apparently healthy men aged 20-69 y with normal weight in baseline. International Journal of Obesity & Related Metabolic Disorders, 28(3), 410-417.

52. Tate, D., Jeffrey, R.W., Sherwood, N.E., &Wing, R.R. (2007). Long- term weight losses associated with prescription of higher physical activity goals. Are higher levels of physical activity protective against weight regain? American Journal of Clinical Nutrition. 85(4), 954-959.

53. Catenucci, V.A. & Wyatt, H.R. (2007). The role of physical activity in producing and maintaining weight loss. Nature of Clinical Practice in Endocrinology & Metabolism. 3 (7), 518-529.

54. Harris, D.J., Atkinson, G., Batterham, A., George, K, Cable, N., Reilly, T… & the Colorectal Cancer, Lifestyle, Exercise, and Research Group. (2009). Lifestyle factors and colorectal cancer risk (2): A systematic review and meta-analysis of associations with leisure-time physical activity. Colorectal Disease. 11(7), 689-704.

55. Newton, R.U. & Galvao, D.A. (2008). Exercise in prevention and management of cancer. Current Treatment Options in Oncology. 9(2-3), 135-146. doi: 10.1007/s11864-008-0065-1.

56. Friendenreich, C.M., & Cust, A.E. (2008). Physical activity and breast cancer risk: Impact of timing, type and dose of activity and population subgroup effects. British Journal of Sports Medicine. 42(8), 636-647.

57. American Institute for Cancer Research (2001). Second expert report. Physical Activity and Cancer Risk retrieved from http://www.aicr.org/reduce-your-cancer-risk/physical-activity

58. Koster, A., Caserotti, P., Patel, K.V., Matthews, C.E., Berrigan, D., van Domelen, D.R., Brychta, R.J., & Harris, T.B. (2012). Association of sedentary time with mortality independent of moderate to vigorous physical activity. PLos One. 7(6), e37696 https://sremote.pitt.edu/pubmed/,DanaInfo=www.ncbi.nlm.nih.gov+22719846

59. Parra-Medina, D., Wilcox, S., Wilson, D.K., Addy, C.L., Felton, G., & Poston, M.B. (2009). Heart healthy and ethnically relevant (HHER) lifestyle trial for improving diet and physical activity in underserved African-American women. Contemporary Clinical Trials. 31(1), 92-104.

60. Staten, L.K., Gregory-Mercado, K.Y., Ranger-Moore, J., Will, J.C., Giuliano, A.R., Ford, E.S., & Marshall, J. (2004). Provider counseling, health education, and community health workers: The Arizona WISEWOMAN project. Journal of Women's Health. 13(5), 547-556.

61. Calderón, C., Balagué, L., Cortada, J. M., & Sánchez, Á. (2011). Health promotion in primary care: How should we intervene? A qualitative study involving both physicians and patients. BMC Health Services Research, 11(1), 62-72. doi: 10.1186/1472-6963-11-62

62. Orrow, G., Kinmonth, A.L, Sanderson, S., & Sutton, S. (2012). Effectiveness of physical activity promotion based in primary care: a systematic review and meta-analysis of randomised controlled trials. BMJ (Clinical Research Ed.). 344, 1389.

63. van Achterberg, T., Huisman-de Waal, Getty, G.J., Ketelaar, N.A.B.M., Oostendorp, R.A., Jacobs, J.E., & Wollersheim, H. (2011). How to promote healthy behaviours in patients? An overview of evidence for behavior change techniques. Health Promotion International. 26(2), 148-162. doi: 10.1093/heapro/daq050.

64. Litaker, D., Flocke, S.A., Frolkis, J.P., & Stange, K.C. (2005). Physicians' attitudes and preventive care delivery: insights from the DOPC study. Preventive Medicine. 40(5), 556-563.

65. Marshall, A.L., Booth, M.L., & Bauman, A.E. (2005). Promoting physical activity in Australian general practices: a randomized trial of health promotion advice versus hypertension management. Patient Education and Counseling. 56(3), 283-290.

66. Buffart, L.M.,van der Ploeg, H.P., Smith, B.J., Kurko, J., King, L., & Bauman, A.E. (2009). General practitioners' perceptions and practices of physical activity counseling: changes over the past 10 years. British Journal of Sports Medicine. 43(14), 1149-1153.

67. Grimvstedt, M.E., der Ananian, C., Keller, C., Woolf, K., Sebren, A., & Ainsworth, B. (2012). Nurse practitioner and physician assistant physical activity counseling knowledge, confidence and practices. Preventive Medicine: An International Journal Devoted to Practice and Theory. 54, 306-308.

68. Reeve, K., Byrd, T., & Quil, B.E. (2004). Health promotion attitudes and practices of Texas nurse practitioners. Journal of the American Academy of Nurse Practitioners. 16(3), 125-133.

69. Verhagen, E., & Engbers, L. (2008). The physical therapist's role in physical activity promotion. British Journal of Sports Medicine. 43, 99-101

70. Dean, E. (2009). Physical therapy in the 21st century (part II). Evidence-based practice within the context of evidence-informed practice. Physiotherapy Theory and Practice. 25(5-6),354-368.

71. Rea, B.L., Marshak, H.H., Neish, C. & Davis, N. (2004).The role of health promotion in physical therapy in California, New York, and Tennessee. Physical Therapy. 84, 510-523.

72. Commonwealth of Pennsylvania State Board of Nursing. Professional and Vocational Standards: Chapter 21, 21-5.

73. Courtenay, M. & Carey, N. (2007). A review of the impact and effectiveness of nurse-led care in dermatology. Journal of Clinical Nursing. 16(1), 122-128.

74. Koelewijn-van Loon, M.S., van der Wejden, T., Ronda, G., van Steenkiste, B., Winkens, B., Elwyn, G., & Grol, R. (2010). Improving lifestyle and risk perception through patient involvement in nurse-led cardiovascular risk management: a cluster randomized controlled trial in primary care. Preventive Medicine. 50(1-2), 35-44.

75. McDowell, N., McKenna, J., Naylor, P. (1997). Factors that influence practice nurses to promote physical activity. British Journal of Sports Medicine. 31(4), 308-313.

76. Whitehead, D., Wang, Y., Wang, J., Zhang, J., Sun, Z., & Xie, C. (2008). Health promotion and health education practice: Nurses' perceptions. Journal of Advanced Nursing. 61(2), 181-187

77. Kramer, M., & Schmalenberg, C. (2009). Accurate assessment of clinical nurses' work environment: response rates needed. Research in Nursing and Health. 32, 229-240.

78. Eakin, E.G., Glasgow, R.E., & Riley, K.M. (2000). Review of primary care-based physical activity intervention studies. Journal of Family Practice. 49(2), 158-168.

79. Burns, K. J, Camaione, D.N., & Chatterton, C.T. (2000). Prescription of physical activity by adult nurse practitioners: a national survey. Nursing Outlook. 48(1), 28-33.

80. Shirley, D., van der Ploeg, H.P., & Bauman, A.E. (2010). Physical activity promotion in the physical therapy setting: perspectives from practitioners and students. Physical Therapy. 90(9): 1311-1324.

81. Zewe, G. (2012). Examination of acute care nurses ability to engage in patient education related to physical activity as a health behavior. Retrieved from University of Pittsburgh Electronic Theses and Dissertations. http://d-scholarship.pitt.edu/cgi/search/simple?screen=Public%3A%3AEPrintSearch&q_merge=ALL&q=zewe&order=-date%2Fcreators_name%2Ftitle

82. Hu, G. & Tuomilehto, J. (2007). Lifestyle and outcomes among patients with type 2 diabetes. International Congress Series. 1303, 160-171.

83. Solomon, T., Sistrun, S, Krishnan, R, Del Aguilla, L., Marchetti, C., O'Carroll, S., O'Leary, V., & Kirwan, J. (2007). Exercise and diet enhance fat oxidation and reduce insulin resistance in older obese adults. Journal of Applied Physiology. 104:1313-1319.

84. Hoddinot, S.N. & Bass, M.J. (1986). The Dillman total design survey method: a sure-fire way to get high survey return rates. Canadian Family Physician. 32, 2366-2368.

85. Lin JS, O'Connor E, Whitlock EP, Beil TL, Zuber SP, Perdue LA, Plaut D,Lutz K. Behavioral Counseling to Promote Physical Activity and a Healthful Diet to PreventCardiovascular Disease in Adults: Update of the Evidence for the U.S. Preventive Services TaskForce. Evidence Synthesis No. 79. AHRQ Publication No. 11-05149-EF-1. Rockville, MD:Agency for Healthcare Research and Quality; December 2010.

86. Implementing U.S. Preventive Services Task Force (USPSTF) Recommendations into Health Professions Education. (2011). Agency for Healthcare Research and Quality, Rockville, MD. http://www.ahrq.gov/qual/kt/tfmethods/impuspstf.htm

87. Michie, S., Abraham, C., Eccles, M.P., Francis, J.J., Hardeman, W., & Johnston, M. (2011). Strengthening evaluation and implementation by specifying components of behavior change interventions: a study protocol. Implementation Science. 6, 10. http://www.implementationscience.com/content/6/1/10.

88. Michie, S., Abraham, C., Whittington, C., McAteer, J., & Gupta, S. (2009). Effective techniques in healthy eating and physical activity interventions: a meta-regression. Health Psychology. 28, 690-701.

89. Michie, S., Ashford, S., Sniehotta, F.F., Dombrowski, S.U., Bishop, A., French, D.P. (2011). A refined taxonomy of behavior change techniques to help people change their physical activity and healthy eating behaviours: The CALO-RE taxonomy. Psychology & Health. 26, 1479-1498.

90. Huedo-Medina, T., Sanchez-Meca, J., Marin-Martinez, F., & Botella, J. (2006). Assessing heterogeneity in meta-analysis: Q statistic or I2 index? CHIP Documents. Paper 19.

91. Pennsylvania Department of Health. 2010/2011 Pulse of Pennsylvania's registered nurse workforce: A report on the 2010/2011 survey of registered nurses. Volume 5, January 2013.

92. Kaplowitz, M.D., Hadlock, T.D., and Levine, R. (2004). A comparison of web and mail survey response rates. The Public Opinion Quarterly. 68(1), 94-101.

93. Broyles, L.M., Rodriguez, K.L., Price, P.A., Bayliss, N.K., & Sevick, M.A. (2011). Overcoming barriers to the recruitment of nurses as participants in health care research. Qualitative Health Report. 21(12), 1705-1718.

94. Glidwell, L., Thomas, R, MacLennan, G., Bonetti, D., Johnston, M., Eccles, L., Edlin, R., Pitts, N.B., Clarkson, J., Steen, N., & Grimshaw, J.M. (2012). Do incentives, reminders, or reduced burden increase healthcare professionals response rates? BMC Health Services Research. 12, 250.

95. Benner, P. From novice to expert. (1982). The American Journal of Nursing. 82(3): 402-407.

96. H□ebert, E.T., O Caughy, M., & Shuval, K. (2012). Primary care providers' perceptions of physical activity counseling in a clinical setting: a systematic review. British Journal of Sports Medicine. 46, (9), 625-631.

97. McAvoy, B.R., Kaner, E.F..S., Lock, C.A., Heather, N., & Gilvarry, E. (1999). Our healthier nation: are general practitioners willing and bable to deliver? A survey of attitudes to and involvement in health promotion and lifestyle counseling. British Journal of General Practice. 49, 187-190.

98. Morgan, I.S., Marsh, G.W. (1998). Historic and future health promotion contexts for nursing. Image: Journal of Nursing Scholarship. 30(4), 379-383.

99. Abramson, S., Stein, J., Schaufele, M., Frates, E., & Rogan, S. (2000). Personal exercise habits and counseling practices of primary care physicians: a national survey. Clinical Journal of Sport Medicine. 10(1),40-48.

100. Jinks. A.M. & Hope, P. (2000). What do nurses do? An observational survey of the activities of nurses on acute surgical and rehabilitation wards. Journal of Nursing Management. 8,273-279.

101. Rosseter, R.J. (2012). Fact sheet: the impact of education on nursing practice. American Association of Colleges of Nursing.

102. Kemppainen, V., Tossavainen, K., & Turunen, H. (2012). Nurses' roles in health promotion practice: an integrative review. Health Promotion International. doi:10.1093/heapro/das034

103. Health Behavior and Health Education: Theory, Research, and Practice, 4th Edition (2008). Editors: Karen Glanz, Barbara K. Rimer, K. Viswanath

104. Davies, N. (2011). Healthier lifestyles: behavior change. Nursing Times. 107, 23: 20-23.

105. Fincham, J.E. (2008). Response rates and responsiveness for surveys, standards, and the journal. American Journal of Pharmaceutical Education. 72(2), Article 43.

106. Van Geest, J. & Johnson, T.P. (2011). Identifying strategies to improve participation. Evaluation and the Health Professions. 34(4), 87-511.

107. Lambe, B., Connolly, C., & McEvoy, R. (2008). The determinants of lifestyle counseling among practice nurses in Ireland. International Journal of Health Promotion and Education. 46(3), 94-99.

108. Wetta-Hall, R., Ablah, E., Frazier, L.M., Molgaard, C.A., Berry, M., & Good, M.J. (2005). Factors influencing nurses' smoking cessation assessment and counseling practices. Journal of Addiction Nursing. 16, 131-135.

109. United States Department of Health and Human Services. (2010). Healthy People 2020: Educational and Community Based Programs. http://healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=11

110. Fei, S., Norman, I.J., & While, A.E. (2011). The relationship between physicians' and nurses' personal physical activity habits and their health-promotion practice: a systematic review. Health Education Journal. 72(1), 102-119.

111. Zenzano, T., Allan, J.D., Bigley, M.B., Bushardt, R.L., Garr, D.R., Johnson, K., Lang, W., Maeshiro, R., Meyer, S.M., Shannon, S.C., Spolsky, V.W., & Stanlye, J.M. (2011). The roles of healthcare professionals in implementing clinical prevention and population health. American Journal of Preventive Medicine.40(2), 261–267.

112. Steptoe, A., Doherty, S., Kendrick, T., Rink, E., & Hilton, S. (1999). Attitudes to cardiovascular health promotion among GPs and practice nurses. Family Practice. 16(2), 158-163.

113. Allan, J.D., Stanley, J., Crabtree, M.K., Werner, K.E., & Swenson, M. (2005). Clinical prevention and population health curriculum framework: the nursing perspective. Journal of Professional Nursing. 21(5), 259-267.

114. Burke, L.E. & Fair, J. (2003). Promoting prevention, skill sets, and attributes of healthcare providers who deliver behavioral interventions. Journal of Cardiovascular Nursing. 17(47), 256-266.

115. Leon, A.S. & Sanchez, A.O. (2001). Response of blood lipids to exercise training alone or combined with dietary intervention. Medicine in Science in Sport & Exercise. 33:S502-15.